FRITZ J. FRANK
President

J. H. VAN DEVENTER
Editor

C. E. WRIGHT
Managing Editor

J. A. ROWAN
News Editor

A. I. FINDLEY
Editor Emeritus

R. E. MILLER
Machinery Editor

F. J. WINTERS
Art Editor

T. W. LIPPERT
Metallurgical Editor

Associate Editors

F. J. OLIVER — W. A. PHAIR — G. RICCIARDI

F. JURASCHEK
Consulting Editor

Washington Editor
L. W. MOFFETT

Resident District Editors

T. C. CAMPBELL, *Pittsburgh* — ROBERT G. BINGHAM, *Chicago*

D. R. JAMES, *Cleveland* — W. F. SHERMAN, *Detroit*

Editorial Correspondents

F. B. RICE-OXLEY, *London, England* — ROBERT G. McINTOSH, *Cincinnati*

G. FRAZAR, *Boston* — P. FIDRMUC, *Hamburg, Germany*

L. E. MEYER, *Milwaukee* — CHARLES POST, *San Francisco*

F. SANDERSON, *Toronto, Ontario* — ASA ROUNTREE, JR., *Birmingham*

LEROY W. ALLISON, *Newark, N. J.* — ROY M. EDMONDS, *St. Louis*

F. T. TURNER, JR., *Buffalo*

★

Owned and Published by

CHILTON COMPANY
(Incorporated)

Publication Office
Chestnut and 56th Sts.,
Philadelphia, Pa.

Editorial and Executive Offices
239 West 39th St.,
New York, N. Y.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, *President*
FRITZ J. FRANK, Executive Vice-President
FREDERIC C. STEVENS, Vice-President
JOSEPH S. HILDRETH, Vice-President
GEORGE H. GRIFFITHS, Vice-President
EVERIT B. TERHUNE, Vice-President
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
JOHN H. VAN DEVENTER, JULIAN CHASE,
THOMAS L. KANE, CHARLES S. BAUR,
G. CARROLL BUZBY, P. M. FAHRENDORF

★

C. S. BAUR, *General Advertising Manager*
A. H. DIX, *Manager Reader Service*

Member, Audit Bureau of Circulations
Member Associated Business Papers
Indexed in the Industrial Arts Index.
Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents. Cable Address, "Ironage, N. Y."

ADVERTISING STAFF

Emerson Findley, 621 Union Bldg., Cleveland
B. L. Herman, Chilton Bldg., Chestnut & 56th Sts., Philadelphia, Pa.
H. K. Hottenstein, 802 Otis Bldg., Chicago
H. E. Leonard, 239 W. 39th St., New York
Peirce Lewis, 7310 Woodward Ave., Detroit
C. H. Ober, 239 W. 39th St., New York
W. B. Robinson, 428 Park Bldg., Pittsburgh
D. C. Warren, P. O. Box 81, Hartford, Conn.

THE IRON AGE

Contents

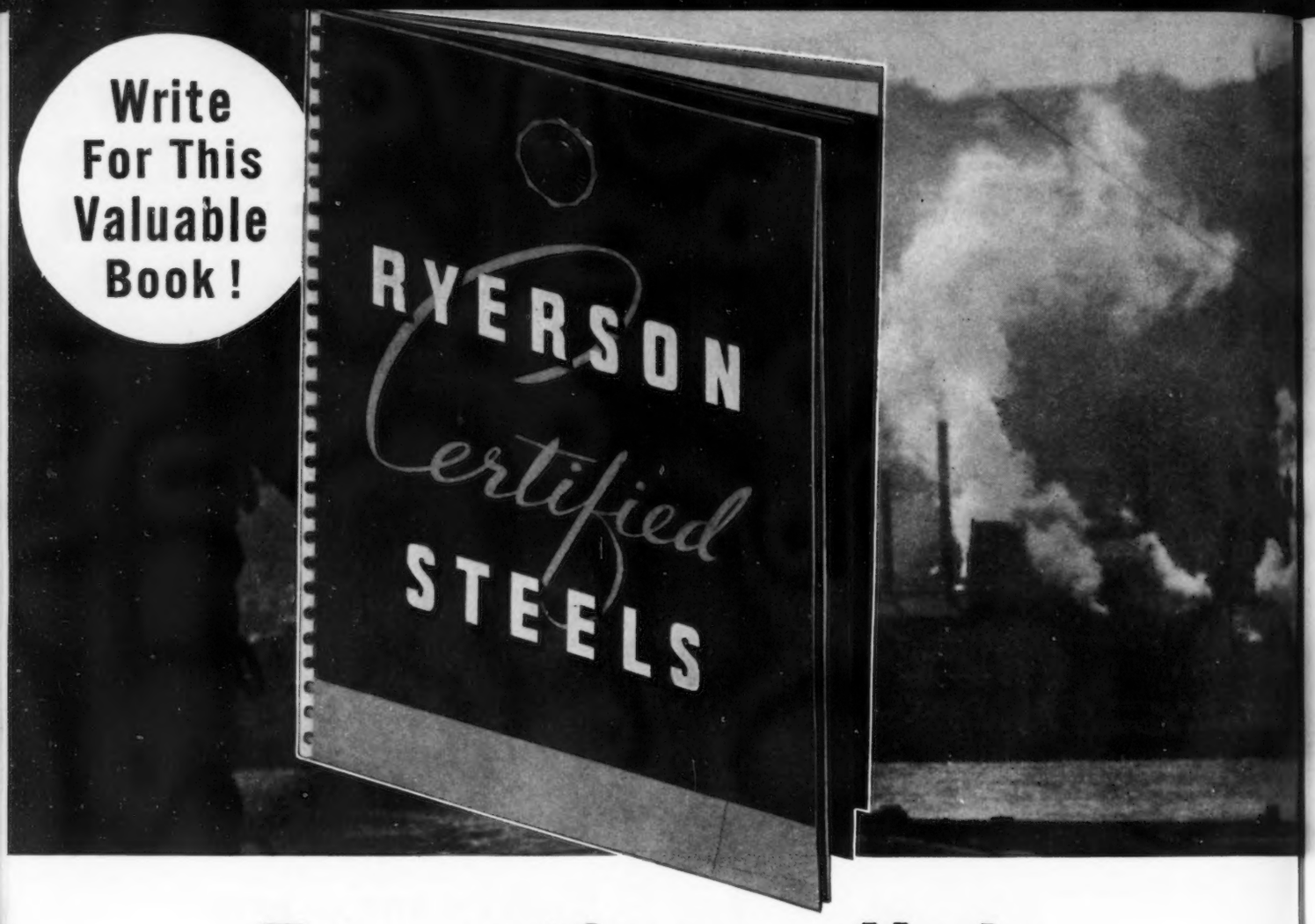
DECEMBER 8, 1938

Beware of "Emergencies" 29
Hairline Imperfections 30
Precision Machine Tools Built by Welding 36
Recent Machine Tool Developments 42
Selecting Furnace-Brazing Metals and Fluxes 48
On the Assembly Line 52
Statistics on Metal-Working Activity 55
Washington News 56
THE NEWS IN BRIEF 74
Weekly Ingot Operating Rate 87
Rate of Activity in Capital Goods 87
October Iron and Steel Imports-Exports 103
Plant Expansion and Equipment Buying 104

▼ ▼ ▼

New Industrial Literature 16
Just Between Us Two 126
Products Advertised 129
Index to Advertisers 154

Copyright 1938 by Chilton Company (Inc.)



Executives—Help Your Purchasing Agents

This Book Shows How

Are you helpful to your department managers? They look to you for suggestions and approval. Are they getting it? In the case of steel—a new, quite remarkable plan has been developed that can mean thousands of dollars in savings or increased profits. But are you familiar with it? Have you passed it on to your steel buyer?

The book illustrated above explains the complete plan — how alloys are selected, pre-tested and accurate data given to your heat treater for guidance — eliminating testing, spoilage, re-treating—saving many hours, dollars — and increasing profits. The book gives similar information on the carbon steels and shows how all departments are served.

We know this book will surprise you and we are sure you will want to show it to your production manager, superintendent, metallurgist and purchasing agent. Get it now so you can really be of help to your department heads. The coupon is included for your convenience.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Lou
Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey C

Please send me, without obligation, a copy of the ne
Ryerson Certified Steel Book.

Name..... *Position*.....

Firm .....

Street Address.....

City..... *State*.....

▲▲▲ THE IRON AGE ▲▲▲

DECEMBER 8, 1938

ESTABLISHED 1855 Vol. 142, No. 23

Beware of "Emergencies"

BACK in 1919, I undertook the job of organizing the Army Ordnance Association. This organization, which includes in its membership the civilian experts and Reserve officers who had been engaged in World War service as well as the executives of hundreds of manufacturing plants which had supplied munitions, became the forerunner of present-day industrial preparedness plans. From this idea developed the present "ordnance district" plan and the "shadow plants" whereby American industry will be all set to go on the arrival of the so-called "M-day."

I cite this record to show that the remarks which follow are not written by a pacifist.

Beware of emergencies, real or fancied, and beware, particularly, of the opportunities which either kind afford to crafty and designing people who know what can be done by and through them.

Orson Welles demonstrated this in his recent hair-raising broadcast of the "War of the Worlds." When you can make millions of Americans believe that we have been attacked by Mars, you can surely make them believe that we are going to be attacked by Japan or Germany, or even by the Swiss Navy.

It may be purely a coincidence, but since Mr. Welles' enlightening demonstration of American credulity took place, there has apparently been a four-folding of the war scare and "preparedness" headlines emanating from Washington. Latest is the vulnerability of the Panama Canal, just discovered after 24 years.

We need preparedness. We should produce armaments which will make us invincible—at home. But preparedness is essentially a long term program. It has to be, because the plants of this country capable of producing armament material could not possibly absorb half the amount now being talked about for next year's expenditure.

Whom have we to fear so immediately as to create an "emergency"? Surely Japan has its hands full in China and will have for some time to come. And Germany, with a navy of less than half the strength of ours and with its problems at home, is not likely soon to undertake an overseas adventure.

The capital goods industries, it is true, are the chief direct beneficiaries of an increased armament program. But we shall be selling our birthright for a mess of pottage if we aid and abet the advocates of "planned economy," through a manufactured and imaginary emergency to set aside the verdict of the elections and to steer a new course toward regimentation.

J. H. Van Deventer

Hairline Imperfections . . . *The Nature*

IN the first half of this article, in last week's issue, page 32, the author defined hairlines, described methods for detection and rating, and discussed various control techniques. The following data pertain to non-destructive testing for hairlines, followed by a summarization of all the experimental data secured.

o o o

ON examining various non-destructive procedures for hairline detection, it should be pointed out that visual examination of the surface and end condition of steel and steel products is unquestionably the oldest method for the determination of imperfections. On smooth surface finishes, this means of detecting imperfections is still very valuable, and a careful inspector may readily observe objectionable surface imperfections and even hairline discontinuities. The use of suitable magnification and lighting facilities aids in a satisfactory visual examination.

Visual Examination with the Aid of Surface Coatings: An old method of detecting cracks in steel castings has also served to a limited extent in the examination of surface imperfections in semi-finished and finished material. The material examined is first immersed, soaked or washed with kerosene oil, or any other thin penetrating light oil, and then the surface is wiped off or cleaned. The relatively dried surface is then painted or coated with a thin mixture of whiting and water, or any other cheap white powder and water, and allowed to dry. Any surface defect or crack in the material will tend to disclose itself by discoloring the white surface since the penetrating thin oil, soaked in the crack, will gradually rise to the surface and color the powder.

This method of visual examination may materially assist in the detection of cracks in irregular shaped materials such as casting, complicated forgings, etc., but, for finished straight material, it should not be used since there are other methods more efficient and suitable.

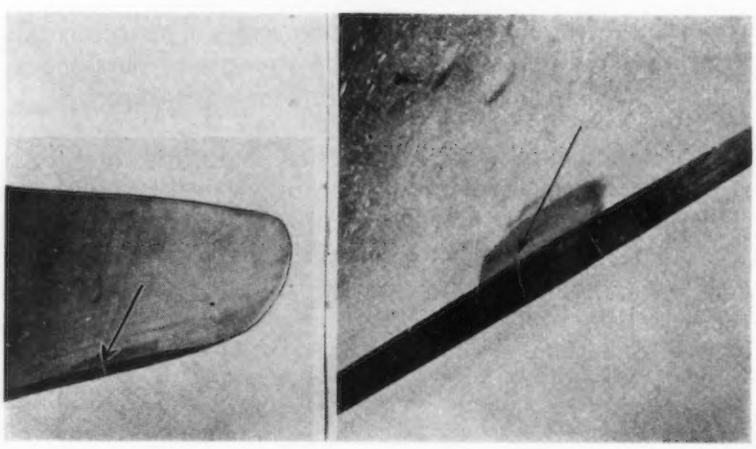
A new visual non-destructive test for the determination of surface imperfections in non-magnetic material such as stainless steels, austenitic steels, brasses, bronzes, aluminum and its alloys, etc., has been recently marketed by the Magnaflux Corp. This method of inspection is really quite simple and seems to be an excellent way of detecting cracks, strains or any other surface imperfection which is capable of causing local stress and strain concentration.

The procedure employed is a coating of the surface of the material with a specially prepared brittle lacquer which adheres very tightly, after drying, to the surface of the material. The coated specimen is then vibrated or strained to produce local strain concentration. If any local strain concentration exists in the material, it ruptures the dry brittle lacquer coating and indicates the position and location of the strain concentration and thereby the imperfection—a crack in the metal is claimed to produce a strain concentration of approximately 10 to 1 in the dry lacquer coating. Consequently, it is only necessary to strain the material normal to the crack or surface imperfection at one tenth in value of the coating in order to rupture the lacquer and thereby indicate any crack present in the metal.

Cracks obtained by this method of inspection are shown in Fig. 6. These photographs reveal a crack present in an aluminum propeller blade after the blade was lightly vibrated.

Magnetic Test Methods; Magnaflux Test: This method of inspection is by no means new, and, considering its general non-destructive aspects, it is not surprising to see the vast strides which it has made in recent years. Since Major Hoke's first application of this test for the inspection of gages and its subsequent use in the inspection of aircraft valve spring wire and springs at the Wallace Barnes Co., Bristol, Conn., for the Pratt & Whitney Aircraft Mfg. Co., this type of testing has received full recognition and wholesale adoption by the aircraft industry, by the Army and Navy Departments, as well as by an ever increasing number of private manufacturing plants.

This form of magnetic testing was originally described by W. E. Hoke (Patent 1,426,384) and further developed by deForest (Patents 1,960,898 and 1,960,899) through the use of specially prepared iron oxides of a definite size and surface covering. The test consists of magnetizing the specimen in such a manner that discontinuities in the material will create a break or polarization in the lines of flux. After magnetization, the specimen is thoroughly covered with a dry powder of high magnetic permeability



# of Hairlines and Methods for Their Detection in Semi-Finished and Finished Steel Products

By CARL L. SHAPIRO
Consulting Engineer, Syracuse, N. Y.

or preferably immersed in a suspension of magnetic oxide powder in either light oil, kerosene, varsol, etc. By either of these methods (dry or wet) the discontinuities, if of sufficient length, width and depth, are indicated by a local periphery adhesion of the magnetic powder in the direction of the defect. Since this test has practically been widely adopted, some details of this means of testing and its potentialities are discussed briefly.

Apparatus: The magnaflux testing apparatus, as it is being marketed (and its use licensed) by the Magnaflux Corp. of America, usually employs a d. c. or a. c. low voltage current up to approximately 4500 amp. Connected to the source of current are copper contacts or rails in or on which the material to be magnafluxed is held or clamped during magnetization. The sensitivity of the test has been greatly increased by the use of copper rods, adapters and special operating technique.

In order to create local polarization at the point of a defect in the specimen, it is necessary to magnetize the part in such a manner that the flux lines are at right angles to the defect, because any discontinuities running parallel to the lines of flux will obviously not be detected. Consequently, the magnetization of the specimen under test is of extreme importance, and it is necessary in the case of irregular shaped pieces or shapes such as a sphere to magnetize the material in several directions in order to insure that all surface and sub-surface imperfections are made visible. Between subsequent magnetizations, it is advisable that the specimen be demagnetized since magnetization in two or more directions tends to oppose each other and reduce the amount of residual magnetism, thereby reducing the sensitivity of the test.

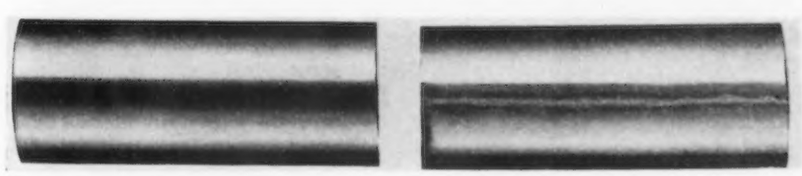
A comparison of the dry and wet testing methods subsequent to the magnetization of the specimen has been very ably presented by Noble, whom we quote in the following:[1]

> "The wet method is used in preference to the dry for several reasons. It is more sensitive and more easily discernible on a machined or ground surface. In most cases the need for cleaning the work is eliminated. Also, the inspectors have found it more agreeable to work with as the dry powder has a tendency to be dusty at times. In the matter of sensitivity we have found that the wet powder will adhere to cracks so small that they can be seen only under fairly high magnification (20 X binoculars are frequently used in this connection). On one occasion when we had reason to suspect the presence of a fatigue crack in a certain location, we found one less than 0.010 in. long, which defied detection at 100 diameters when the powder had been removed. Of course, the dry powder would not show anything in this case, as the particle size is too large. On the other hand, the wet powder will not pile up to give an indication of depth, regardless of the size of the defect.
>
> "In the case of a large crack with an appreciable width, the wet powder will fill up the crack and not pile up, and a black line will still be visible, even after attempts to wipe it off. If the dry powder were used, it would pile up, the deeper the crack the greater the amount of powder it would hold, and the more the powder would resist dislodgment by tapping or blowing. Thus, with a certain amount of experience, an inspector can estimate the seriousness of a defect. On rough forgings and welds, only the dry powder can be used to advantage."

More recently the sensitivity of the magnaflux test has been greatly enhanced by magnetizing the specimen while immersed in the test solution. It is obvious that this method, employing B_{max} (maximum magnetic lines which can be induced in the specimen) as against the usual B_r (residual lines of magnetism remaining after the magnetizing current is released), will materially intensify the polarization caused by an imperfection.

Being strictly a magnetizing test method, any condition (surface or sub-surface) capable of producing a

[1] H. S. Noble, "Magnaflux Inspection Methods in Airplane Engines," Metals and Alloys, July, 1936, pp. 167-170.



ABOVE

FIG. 7—Imperfections revealed by the dry powder magnaflux test method in carburized material. The two specimens are shown here natural size, the one on the left being annealed and that on the right being annealed and carburized.

AT LEFT

FIG. 6—This aluminum propeller blade was coated with a brittle lacquer and lightly vibrated. The crack shown was thus disclosed.

localized magnetic polarization will be shown by the adherence of some of the powder and, consequently, the results of this test are subject to all the advantages and shortcomings of the physical laws of magnetism. In view of the foregoing, the sensitivity of this test is largely dependent on: composition and structural condition of the material, shape and surface finish, the type of magnetization which is used (B_{max} or B_r) and on the dimensions (width vs. depth) of the imperfections, etc.

In general, any chemical, structural or mechanical condition which influences the magnetic characteristics of the material will affect the sensitivity of the magnaflux test since B_{max} and B_r determine the amount of polarization under any fixed conditions. Consequently, the magnaflux test will not only show actual hairline discontinuities, cracks, seams or any similar surface defect, but will also show any surface or sub-surface strain condition, structural segregation, and nonmetallics which are located near the surface. In other words, this test will reveal by means of magnaflux lines any conditions which are capable of causing local polarization.

To illustrate the foregoing, consider an actual experience at the plant of a manufacturer of airplane parts from electric furnace steels of the SAE 2512 and SAE 3312 types where, in spite of the most rigid final inspection tests at the mill, as well as close acceptance tests on the incoming material by the customer, it was a common occurrence for stock which had satisfactorily passed the magnaflux inspection in the annealed condition to be rejected by the same tests in the finished, carburized and heat treated parts.

In an attempt to correlate these results, 6-in. pieces of a bar of 1⅜-in. round (SAE 2515) of a particular lot in question, were magnafluxed in the annealed condition, and the test showed no imperfections whatever.

The 6-in. pieces were then cut in half; one of the halves being hardened in accordance with the customer's procedure which consisted of carburizing 8 hr. at 1700 deg. F. (furnace cooling), reheating in a lead bath (1550 deg. F.) for 8 min., oil quenching and reheating again in another lead bath to 1425 deg. F., oil quenching and tempering at 275 deg F. After this heat treatment, the specimens were reinspected by the magnaflux test. The results, which are given in Fig. 7, after the dry method magnaflux test, showed that some of the carburized specimens had

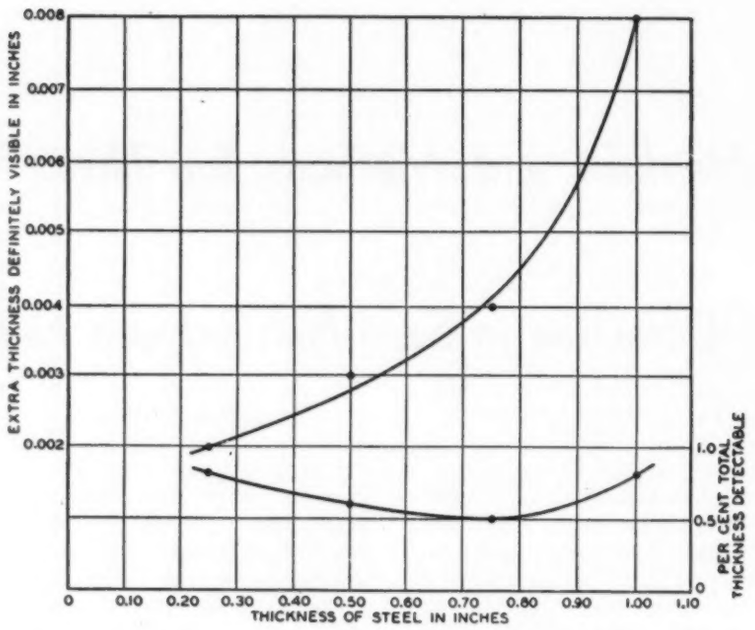


FIG. 8—Sensitivity of a 200,000-volt Coolidge tube in the detection of irregularities in steel. Upper curve gives thickness in inches and lower curve gives thickness detectable in per cent. Greatest sensitivity is on ¾-in. material.

imperfections running the entire length of the 3-in. pieces; whereas, the original annealed material was absolutely free from any defects.

A microscopic examination revealed the annealed material to be entirely free from any structural segregations or imperfections, even at the point at which the magnaflux lines occurred in the carburized sample, while the carburized specimens showed definite sub-surface hairlines (open discontinuities).

To determine the cause of this phenomenon, series of annealed specimens were subjected to a microscopical and magnaflux examination after each of the above steps. The findings of the investigation showed that after the first heat treatment (1550 deg F., oil) the specimens were still satisfactory; whereas, after the additional hardening (1425 deg. F.) in lead which was followed by an oil quenching, many specimens were found to contain open discontinuities in the eutectoid portion of the carburized case. Experiments to determine the underlying cause of this phenomenon indicated that the rapid rate of heating in the lead bath was primarily responsible for these failures since several series of samples which received the second heat treatment in an electric furnace, instead of the lead bath, were found to be entirely satisfactory.

Commenting on the merits of the magnaflux test method, the author would say that to date this test is really an excellent means for the nondestructive testing of finished steel products. However, its use on semi-finished material, as for instance on billets, bar stock or rough forgings, is considered as not very satisfactory in view of the following limitations:

(a) The surface condition of semi-finished in contrast to finished products is such that the test is much less sensitive. Moreover, the finished products are usually hardened; whereas, the semi-finished are not; thus, the sensitivity of the magnaflux test is further increased.

(b) The rough surface of the semi-finished products makes interpretation of results very difficult.

(c) The difference in size and dimensions between raw materials and semi-finished stock and the finished products is usually sufficient to make it impossible to intelligently interpret the magnaflux test results in the semi-finished stage with respect to what may be observed on the finished part.

(d) The additional fact that the magnaflux test may indicate everything from an open surface discontinuity to a light subsurface structural segregation; in fact, any condition which will produce a local polarization of some kind, and inasmuch as no suitable standard has been developed for a satisfactory interpretation of certain types of magnaflux lines, cause the author to consider this test method a rather dangerous and expensive tool in the hands of the inexperienced. The adage that "A test is no better than the interpretation of its

results" is particularly true in this case.

Since the adoption of the magnaflux test method, numerous modifications have been developed for special requirements. The following two have found rather wide application.

Instead of the direct use of a high and low voltage magnetizing current, this modification (Equipment Engineering Co., Ltd., London, England) energizes the test piece, which forms the yoke in a closed magnetic circuit by means of a specially wound coil. To control the sensitivity, a slider potentiometer of high resistance is employed, the electrical supply being coupled to the two ends of the potentiometer coil, while the electromagnet coil is connected to the two sliders. Thus, any desired value of current can be passed through the coil in either direction.[2]

Another method which is especially useful on castings and forgings is the so-called flash magnetization method developed by the Woolwich Arsenal (England). Instead of the usual stationary magnet, this method employs a magnetizing coil which is passed through a steel cylinder forming a closed magnetic circuit with the application of the current. By placing the specimen within this cylinder, magnetization is effected. The subsequent inspection is similar to the magnaflux, that is, either the wet or dry method may be employed.

To illustrate the electrical testing methods, the so-called Fermango[3] test is briefly described.

This test is used especially on sheets and wire and measures primarily the comparative magnetic permeability of the material against a previously determined standard. The principle involved is simple. Two coil units contain a primary and secondary winding. The material to be tested passes through one coil while the known standard is used as the core of the other coil. Therefore, since the coil windings oppose each other, any variation in the physical characteristics of the unknown to the standard will produce a difference in the relationship between these windings, which is then recorded by means of an oscillograph either in a straight line or sine wave, depending upon the difference in the material.

Radiography: X-ray and gamma-ray tests depend upon a variation in the intensity of the penetrating beam when it reaches the photographic film directly behind the exposed specimen. This variation in the penetrating beam results from the different rates of absorption of the material through which the beam passes and, if no variation in the absorption rate of the material exists (inclusion, heterogeneities or discontinuities), the film is uniformly exposed, indicating homogeneity.

The sensitivity of the X-ray nondestructive test for determining the hairlines, seams, streaks, etc., has been clearly shown in the report of Abbott and Lippert,, in which a 200,000-volt, air cooled Coolidge X-ray tube was used. Quoting:

> "This investigation demonstrated that in a thickness of 0.5 in. of steel differences in thickness parallel to the path of the X-radiation representing 0.5 per cent of the total thickness may be detected. For 1 in. steel thickness, the sensitivity of the X-ray method is in the neighborhood of 0.8 to 1 per cent of the thickness, and for 2 in. to 3 in. sections defects representing a difference of 2 per cent in thickness may be readily detected. The upper curve (Fig. 8) shows the minimum thicknesses of steel detectable for various total thicknesses of steel penetrated by the rays.
>
> "The lower curve (Fig. 8) shows the same data in a different form. The per cent of total steel thickness detectable is plotted against the total steel thickness. If an X-ray photograph of a casting or metal joint has an even density, it can then be estimated that any defects that are included but not detected are less than the minimum established by the data shown."

Although X-rays and gamma rays are capable of showing defects in steel, they cannot be classified as a useful tool for the determination of surface imperfection since the penetrating beam must pass through the entire thickness of the material to the photographic film or fluorescent screen

[2] H. Bevan Swift, "Magnetic Crack Detection"; Heat Treating & Forging, Vol. XXIII, No. 6, June, 1937, pp. 279-280.

[3] "Fermango Magnetic Inspection Equipment," Ferrous Magnetic Corp., New York—Catalog No. 2.

[4] Lester E. Abbott and T. W. Lippert, "Sensitivity of X-Ray Examination of Metal Defects," THE IRON AGE, May 24, 1934, pp. 12-14.

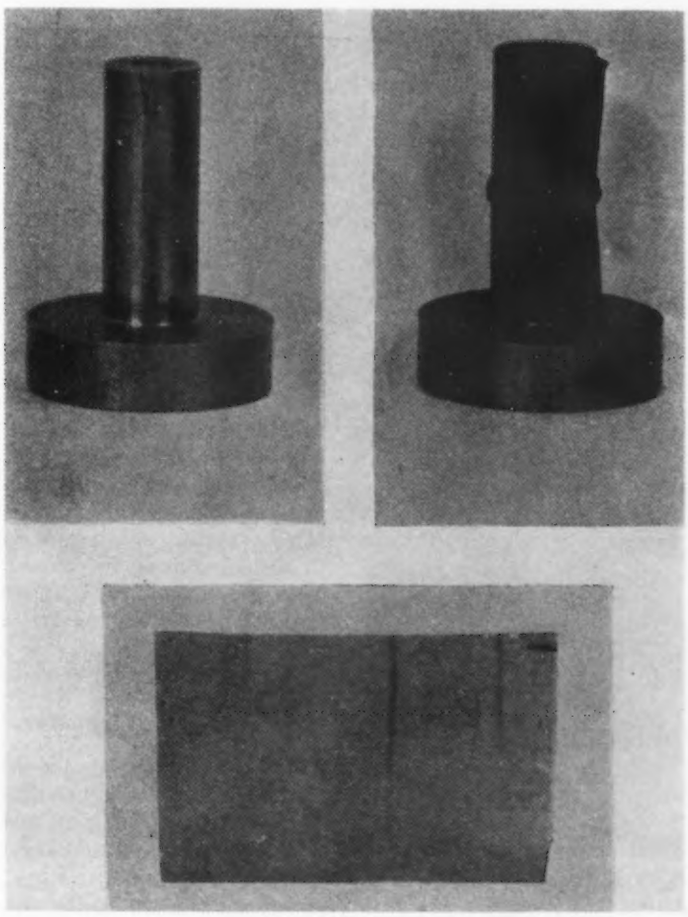


FIG. 9—Cracked bronze bar stock and auto-radiograph of cracks. (Kaiser).

before the defect may be observed. Hence, in the interpretation of these results, the exact location of the defect in the material cannot be readily ascertained without further tests. Consequently, for normal routine laboratory or mill inspection for the determination of surface imperfections in semi-finished and finished steel products, X-rays and gamma rays cannot be classified as a commercial test method for detecting surface imperfections.

Radioactive Methods of Examination: An entirely new method of defects detection in metallics has been recently advanced by H. F. Kaiser of the United States Naval Research Laboratory.[5] This method of inspection at present does not apply to the determination of surface imperfections but, nevertheless, it is explained briefly since it possesses great merit and promises to open a new field of inspection in the future.

The underlying principle involved in this test method is to introduce into the cavity, crack, fissure, etc., a radioactive substance which is later detected by either photographic or electrical means.

The radioactive material used may be any of the radioactive elements. However, due to their cost and danger of handling, the pure elements are never used but only liquid solutions of the radioactive salts. Since the most inexpensive and safest of the elements is thorium, the thorium compounds, ThO_2 and $Th\ (NO_3)_4$, offer the desired properties and characteristics. These salts are prepared in various kinds of fluid solutions such as, (a) aqueous solutions (many of the compounds of the radio elements are fairly soluble in water and the gaseous radio elements dissolve according to Henry's law), (b) non-aqueous solutions of radioactive compounds or gases, and (c), the use of viscous fluids in which the radioactive material is held as a mechanical suspension. The advantages of these salt solutions are, (1) inexpensiveness, (2) easier to handle, and (3), they yield a much higher concentration of radioactive atoms than that obtainable by the radioactive gases.

To determine the condition of the material, the radioactive solution is introduced into the cavity of the crack, fissure, gas hole, etc., with or without the aid of hydraulic pressure. After the surface of the defect is impinged with the radioactive concentration either by surface contact with the fluid solutions or by the gaseous emancipation, the material is examined photographically or by electrical methods.

When examined photographically, by the use of sensitive plates or films, the film is wrapped around the specimen as is shown in Fig. 9 and exposed for a period of approximately six days. After the film is developed, the blackened lines indicate the position, form and relative size of the defect.

The electrical method of detecting and measuring small amounts of radioactive substances present in the metal, after the solution treatment, works upon the principle of electrical ionization by measuring the amount of the atoms or molecules of air or other gas through which the radiation passes. The ionization of the gas allows the passage of an electric current between electrodes placed in the ionized gas. Consequently, the magnitude of this ionization current is a measure of the intensity of the radiation producing the ionization. Fig. 10 shows a portable machine which measures the amount of ionization.

Inasmuch as this radioactive method for detecting defects in metallic alloys has just been advanced and since it seems to offer another method for determining hairline imperfections, it should not be overlooked in the coming years for the detection of surface and internal defects in metals and alloys.

Micro-chemical Examination: This method of surface examination depends upon the chemical reaction which occurs between surface nonmetallics and an emulsified (photographic or gelatine) paper which is saturated or impregnated with an acid reagent. This method of surface examination has been quite universally adopted for the determination of sulphur inclusions and, to some extent, for phosphorus. Heyn and Bauer were the first to apply this method of surface examination, which was further developed by Baumann. Although there are numerous modifications, the Baumann method is illustrative of the principle involved.

Baumann Method: Emulsified paper is soaked in a dilute solution of sulphuric acid (2 to 5 per cent) for 10 to 60 sec., depending upon the composition of the material, size of defects and type of photographic paper. The specimen, which is examined, is gently pressed against the acid impregnated paper, held for from 20 to 60 sec. and fixed in sodium hyposulphite to remove the excess bromide, then washed and dried. The dark stains recorded on the photographic paper indicate the presence of inclusions. A more complete description of this and other methods is given by Sauveur.[6]

Niessner Method: Another method of micro-chemical examination has been developed by Niessner,[7] for the identification of iron bearing surface inclusions. A photographic paper (emulsified or gelatine) is soaked in a weak solution of hydrochloric acid (1.20) for approximately five minutes. The paper is dried, to remove all free acid drops from the emulsified surface, and the polished surface is firmly pressed for a short period of time upon the emulsified surface of the acid saturated paper. The time is usually 20 to 30 sec., depending upon the type of photographic paper, composition of material, type of inclusion and developing conditions. The paper is then developed either in a solution of ferric or ferrocyanide. The cyanide development indicates the presence of iron bearing non-metallic inclusions by the presence of dark blue spots. Since this method has only recently been developed, further details may be obtained from Mitsche's article, "Iron Oxide Printing."[8]

The foregoing described test methods are used throughout the metallurgical industry to detect imperfections in steel, and the manner in which they are detected (test method) depends mainly upon personal preference and the type of material under inspection. This fact has been clearly and markedly illustrated by the results of the questionnaire and the author wishes to add, before closing, that it is becoming more and more necessary that the various tests become standardized and evaluated before much progress can be achieved in the elimination of surface imperfections.

SUMMARY

In summarizing the foregoing information, which of necessity had to be presented in a most generalized form, the author would like to stress the following points:

(1) Hairline discontinuities in steel and steel products are minute imperfections which are caused during the

[5] H. F. Kaiser, "Possible Uses of Radioactive Substances in the Testing of Metals," A. S. M. Preprint No. 20, 1938.

[6] "The Metallography and Heat Treatment of Iron & Steel," Albert Sauveur, 6th Edition 1936, McGraw-Hill & Sons, New York.

[7] Micro-chemical Surface Examination (Mikrochemische Oberflachen Profung), N. Neissner, Berg und Huttenmannisches Jahrbuch, Vol. 84, Oct. 27, 1936, p. 105. Methods (Ueber den Nachweis, von Oxydinschlussen durch Abdruckyorfahren) R. Mitsche, Berg and Huttenmannisches Jahrbuch, Vol. 83, Dec. 23, 1935, pp. 127-133 (Metals & Alloys, June, 1936).

[8] "Iron Oxide Printing," R. Mitsche, Metal Progress, March, 1936.

liquid state of the metal and which must be considered a heat condition or characteristic.

(2) Minute imperfections in steel are classified and defined as follows:

A hairline may generally be defined as a discontinuity, crack or rupture of hairline dimensions in metal.

A seam of hairline proportions (hairseam) is defined as a solid elongated non-metallic discontinuity due to the presence of non-metallics or inclusions, etc.

Streaks, ghost lines, dendrites, etc., are considered as solid heterogeneities of a metallic or non-metallic nature, or both, within the material due to segregation of an element or elements, solid solution(s) or compound(s) other than non-metallic inclusions or hairseams.

(3) By means of a favorable melting procedure and suitable subsequent processing practices, it is possible to limit the number and severity of these imperfections to some extent. However, to date the author knows of no melt which has ever been found to be entirely free from these defects.

(4) Due to their analyses and structural characteristics, certain compositions are more prone to hairline imperfections than others.

(5) While it is acknowledged that any hairline discontinuities are undesirable, their actual seriousness as points of stress concentration and causes for premature service failures of highly stressed parts has not been definitely proved.

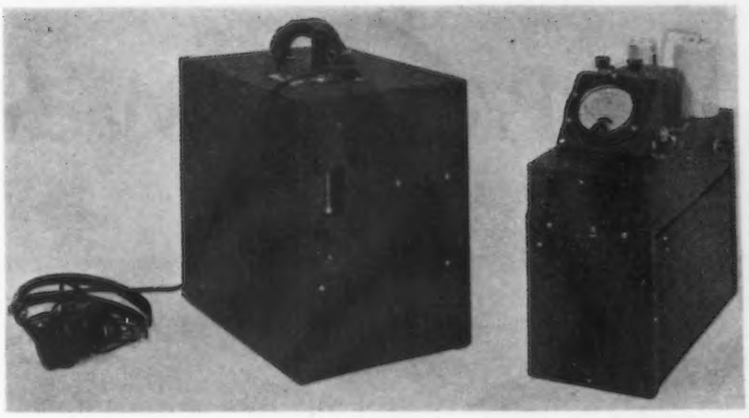


FIG. 10—Sensitive Geiger-Müller counter and simplified counting rate meter for detecting and measuring small amounts of radioactive material. (Kaiser)

(6) The hot acid etch test combined with a careful microscopic examination for non-metallics and the taper or stepdown hairline test are considered the most useful inspection methods for the determination of the hairline condition of a heat of steel.

(7) On finished steel products, the outstanding test for the detection of hairline imperfections is the magnaflux test method. It is unfortunate that the results of this test are very much subject to misinterpretations as to the actual quality characteristics of the material under test and it is hoped that suitable interpretation standards for this test method will soon be developed.

(8) The magnaflux test is not suitable for routine preliminary finish or acceptance test of semi-finished steel products, because of the many variables which influence the test results and their interpretation.

ACKNOWLEDGMENT

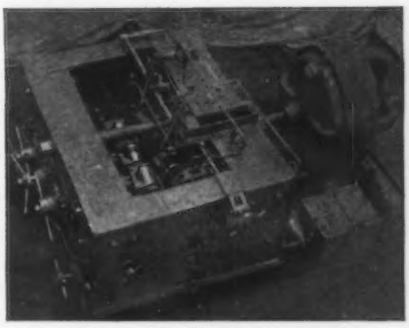
The author wishes to express his sincere thanks and appreciation to the following men for their cooperation and interest in our questionnaire and work:

R. S. Archer, E. C. Bain, A. H. Boegehold, H. D. Bubb, Jr., G. Charlton, H. L. Day, A. V. deForest, E. H. Dix, G. E. Doan, O. W. Ellis, J. V. Emmons, L. L. Ferrall, H. J. Fischbeck, M. M. Fox, J. P. Gill, H. Gillette, F. Giolitti, J. H. Hall, L. D. Hawkridge, V. O. Homerberg, K. Honda, V. W. Krivobok, R. G. Kennedy, Jr., H. W. McQuaid, R. F. Mehl, J. H. Nead, A. M. Portevin, V. E. Pullin, R. S. Rawson, A. Sauveur, H. Scott, S. C. Spalding, N. I. Stotz, B. Stoughton, R. T. Swinden, K. R. Van Horn, L. R. van Wert and A. E. White.

The author desires to express his sincere appreciation to Mr. R. Schempp, metallurgist of the Halcomb Steel Division of the Crucible Steel Co. of America for his constructive criticisms and pertinent suggestions throughout the course of this study.

Straightens and Sizes Commercial Bars

HOT rolled pickled and limed commercial bars can be straightened, sized and finished within 0.002 in. at the rate of 200 to 300 ft. per min. in a new machine just put on the market by the Sutton Engineering Co., Park Building, Pittsburgh. The machine will also size to the same accuracy bars that have not been pickled and limed, just as they come from the mill. In that case, much of the scale will be removed and all pit marks will be rolled in, giving the bar a very smooth finish. Sizing can be accomplished on bars from ½ to 2 in. diameter. The unit will also straighten high tensile oil-quenched round bars from ½ to 1½ in. in diameter.



HOT rolled bars can be straightened within small limits on this newly developed Sutton high speed straightening machine.

This machine is Timken bearing equipped throughout. Except for four grease fitting points, lubrication is taken care of by a separate motor driven pump. The rolls on the machine are of 90 Shore hardness, and the angle of all rolls is adjustable so that uniform results can be obtained on all sizes of bars. Because of the speed of the operation, the processing is done at a very low cost per ton.

Precision Machine Tools Built

THE fabrication of steel by welding has progressed very rapidly in the last few years. Progressive machine tool builders, like those in other industries, have investigated the possibilities of using this method of construction in their product. Additional work with welded steel structures has been predicated on their early results.

Naturally some mistakes were made in practically every field that welding has entered, because the initial efforts were not always properly directed nor intelligently supervised.

It is a pleasure to report that machine performance problems directly attributable to weldng are quite rare and seldom indeed get past our "run-off" inspection.

Rigidity in Machine Tools

Let us consider the matter of rigidity. This is a subject about which machine tool builders are indeed sensitive. How many times have we heard the remark that steel just won't do where rigidity rather than strength is the important consideration?

In a particular case we had been using a ¾-in. wall section of cast iron. We calculated the corresponding section in steel, assuming that it could be done. Since modulus is the measure of rigidity, we tried to multiply $\frac{3}{4}$ in. $\times \frac{12{,}500{,}000}{30{,}000{,}000}$ getting 0.3, and then built machines with wall of 5/16 or ⅜-in. plate.

We found the structure to be flimsy. It was warped out of shape by too much welding, and the bare rod weld-metal deposited was quite brittle and often cracked. Stress relieving was not understood and was often improperly done, if at all.

What was wrong with our theories? Was not modulus a measure of rigidity? Was there no way to produce stable structures? Were all steel structures to be noisy, subject to troublesome vibrations?

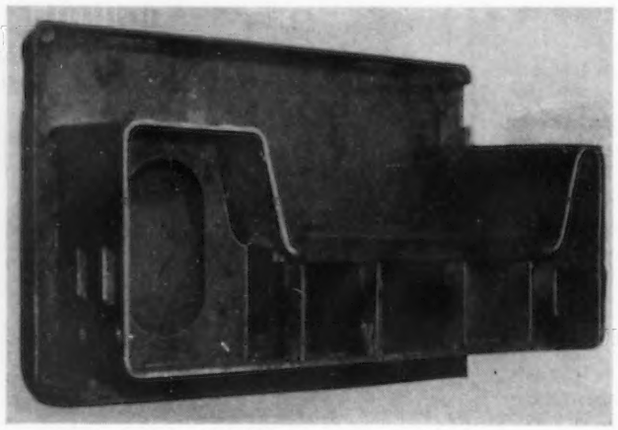
Let us consider what we have learned from our problems. When we stop and look at our present developments in welded machine tool structures and consider the weaknesses and errors of our first attempts at welding, we realize that the error was not in our theories, nor was it due to the material we used. The difficulty was primarily where we put this material, how we joined it to the adjacent pieces, and what steps we took to relieve the stresses after fabrication.

What Was Overlooked

When we first started to substitute steel for cast iron we overlooked the basic fact that castings contained many ribs, generous fillets and the most vital condition, that is, one section blends into another in such a manner that all the surfaces, walls and ribs work together as one mass. The common frequency of such a structure is quite low, and in addition cast iron does indeed have a much lower response frequency than steel.

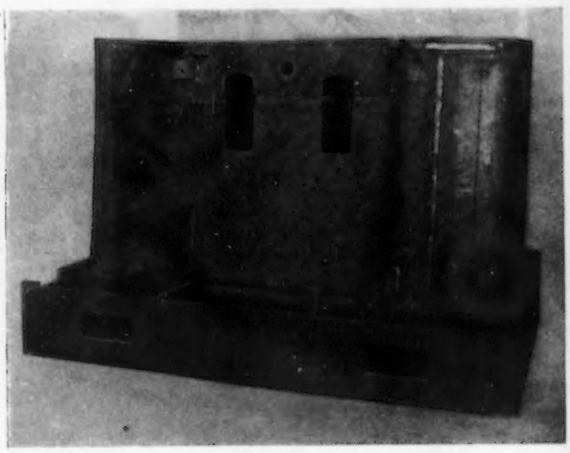
It is well known that cast-iron structures age and relieve their stresses even under ordinary use and condition. It is also known that the stress-strain curve of cast iron is not linear, namely the proportionality between the stress and the corresponding deformation or strain even at light stresses, does not follow a straight line. Consequently the deformation produced on any structure made of cast iron is partly elastic and part of it is plastic, thus resulting in a permanent set. This particular behavior of cast iron has been investigated by W. E. Dalby.*

In the case of steel, the stress-strain relationship is represented by a



AT LEFT

FIG. 1—View looking into No. 6 centerless grinder bed, showing the internal ribbing.



AT RIGHT

FIG. 2—Front view of completed No. 6 centerless grinder bed, illustrating the smoothness of the joints.

* W. E. Dalby, *Phil. Trans. Roy. Soc.*, Ser. A, 221, 1920. A. E. H. Love Mathematical Theory of Elasticity, pages 114-115.

by Welding—I

By L. F. NENNINGER and
W. A. MADDOX

Chief Engineer and Supervisor of Welding, respectively, The Cincinnati Milling Machine Co. & Cincinnati Grinders, Inc.

SOMETHING of what has been done by a prominent builder of milling machines, grinders, and broaching machines in making use of welded steel construction is told in this article, which is from a paper on "Recent Developments in the Welding of Machine Tools," presented at the 19th annual meeting of the American Welding Society, held recently at Detroit.

Welded construction has been thoroughly studied and carefully applied. Knowing both cast iron and steel, the authors state that use of welded steel in future constructions depends largely upon the suitability of the material for a particular application and its ability to equal or get below the cost of cast-iron designs.

For convenience the article is divided into two parts, the first of which includes discussion of the problem of rigidity and some of the advantages of welded steel, including flexibility of design, lighter weight, and possibilities in the direction of more modern styling. Use of the newer process is illustrated in this part in connection with centerless grinders and Hydromatic milling machines.

straight line up to the true limit of proportionality, beyond which a slight increase in stress may produce considerable increase in strain. Now, if we have a welded steel structure, the stresses which are produced in it due to welding may be of an intensity such as to subject the structure to deformations obtaining beyond the limit of proportionality; therefore, the structure will be distorted, until equilibrium is reached between the stress and corresponding strain.

The additional load, which corresponds to the residual stress, will cause a still greater permanent deformation. In order to avoid this condition, it is desirable to reduce the internal stresses to a point far below the proportional limit. The stress thus obtained, which can be called a residual stress, when added to external stress produced by a load under use, should not exceed the proportional limit; otherwise, when high loads are applied, we will produce a stress such as to cause a plastic flow and a permanent deformation will result. If then, by some type of stress-relieving process, the residual stress may be reduced to some value in the vicinity of 3000 lb. per sq. in. or less, a stable structure will be produced.

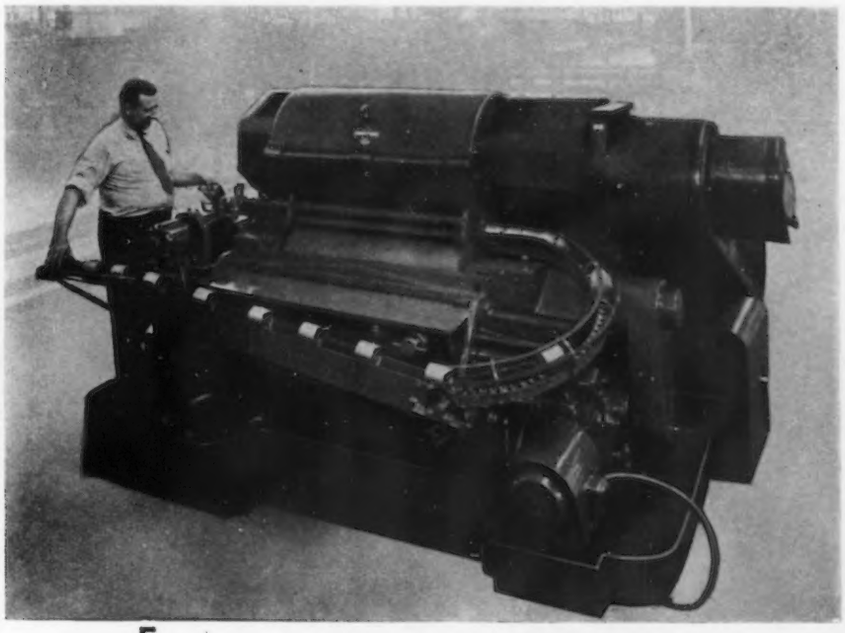


FIG. 3—No. 5 centerless grinder used to rough grind pistons.

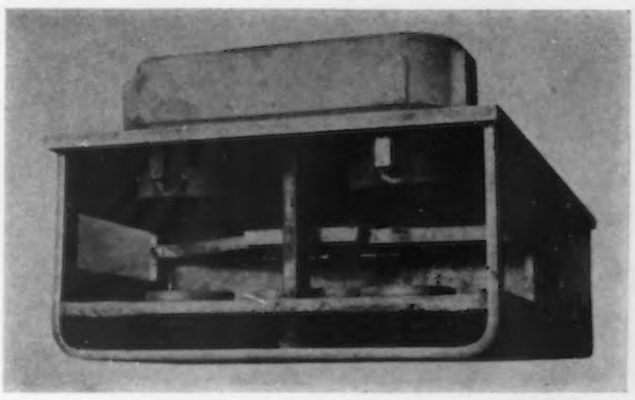
In the matter of thermal stress-relief, there is much experimental evidence available[1] to show that if we heat a welded steel structure through the correct heating and cooling cycle, holding it at approximately 1200° for a reasonable length of time usually (1 hour/inch thickness), the residual stress will be below 3000 lb. per sq. in. This value is so definitely below the proportional limit for steel that a stable structure is insured..

This fundamental and essential difference in the plastic flow of cast iron

o o o

AT RIGHT

FIG. 4 — Looking into the end of a fixed-height rail having a built-in spindle carrier. Used on the special Hydromatic pictured in Fig. 5.



o o o

[1] Interpretation and Use of Creep Results, by J. J. Kanter, *A. S. M.* 1936 Convention. The Rupture Strength of Steels at Elevated Temperatures, by White, Clark & Wilson, *A. S. M.* 1937 Convention.

Stress Relief by Annealing, Research Supplement *The Welding Journal*, Nov., 1937, page 38.

The Welding Handbook, pages 403-415.

and steel has a most important bearing on the use of welded construction.

In other words, if we build a good stable, accurate cast-iron machine tool and put it on a foundation that is not the best and the foundation settles, the cast-iron machine will take a set that is definite. Even if the trouble is corrected, the bed will still be out, until it is remachined or forced back into place by a new stress produced by clamping and jacking to make it take a new set. Steel on the other hand will, as shown above, after proper stress relief, be permanent unless forced past the proportional limit. Take a large stress-relieved flat steel bed, support it on three corners for an indefinite period, level it, then check it and it will not have taken a set out of flat. This is indeed a valuable characteristic.

Valuable Properties of Cast Iron

It would not be well for the machine tool builder to forget the really wonderful properties of cast iron. It is an almost ideal material for his purpose from many points of view. Its strength is more than sufficient for most requirements encountered in machine tool design. It has a deadening power and a most amazing ability to absorb vibration that no other suitable metal possesses. It has natural internal properties that enable it to dampen vibration set up by the various machining processes. It can be planed or milled to form a "way" or guide surface which is suitable for almost all applications. You are all familiar with machine tools 10, 20 and 40 years old whose scraped surface has not worn the few tenths of a thousandths of depth of the scraper mark. Early welded structures used bolted-on cast-iron ways and such ways are still being used in some applications. The rigid and hard requirements imposed on production machine tools in high production shops in a number of cases has led to the use of hardened way surfaces. Whether this is justified for ordinary usage is a matter much discussed and is now being carefully considered.

This development is having one interesting result—it reduces the difference in cost between cast iron and steel for certain structures. This means it has become economical to place certain structures in steel which would have been made of cast iron because of the cost of applying separate slide way strips for the steel machine.

The Design Problem

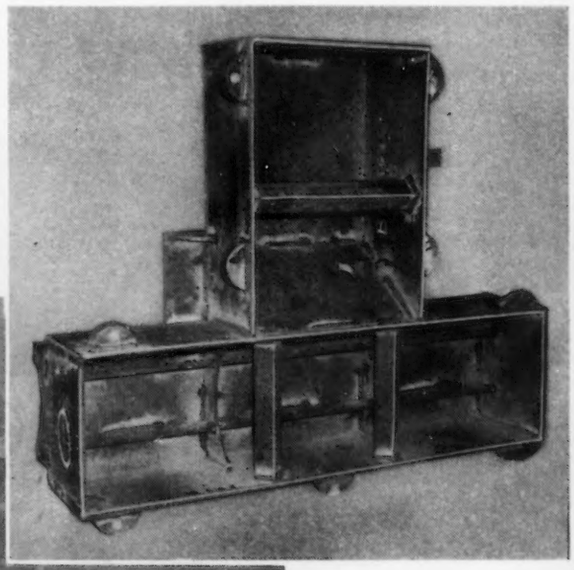
The designing engineer in fabricating a machine tool of steel has the problem of getting all the essential properties into the steel structure that are inherent in a good casting, the technique for the making of which has been many, many years in the development. For example, a big flat uninterrupted area is considered bad foundry practice, while such a flat slab is more or less inherent to steel. Nevertheless, such an area of cast iron is definitely more dead, more suitable for a machine tool structure than the flat steel plate of a corresponding size.

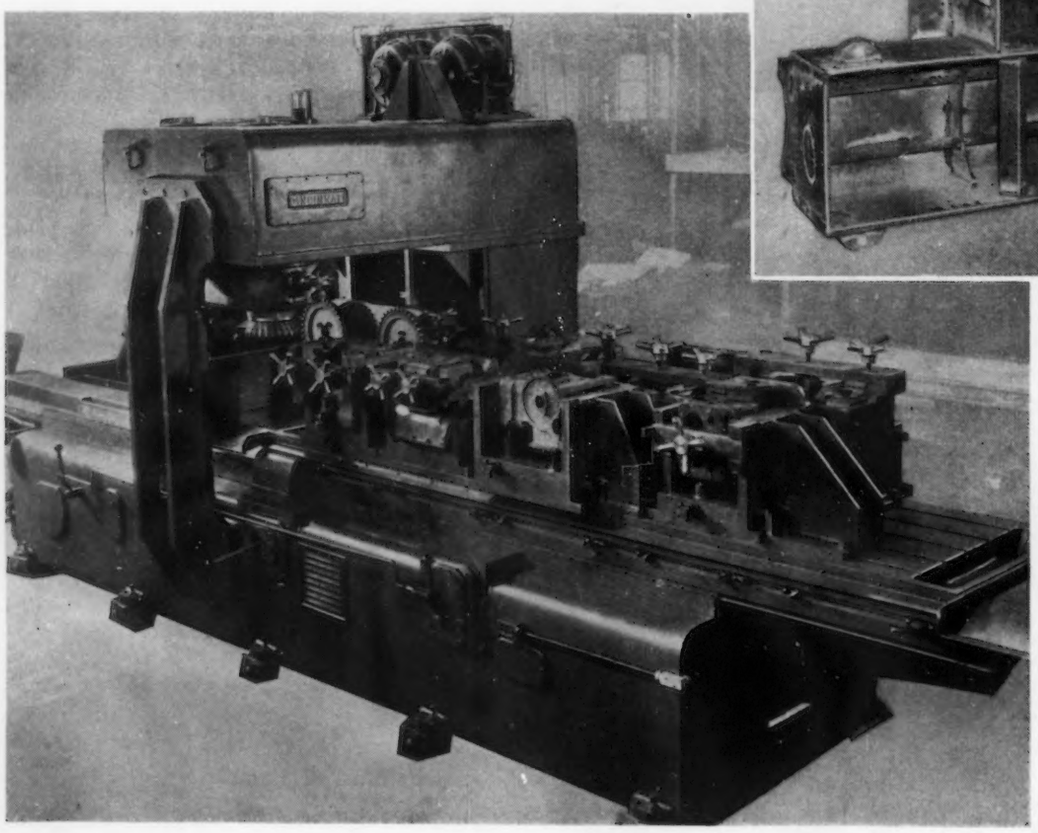
The average machine tool designer has worked so long with cast iron that

o o o

AT RIGHT

FIG. 6—Bottom view of light-weight welded steel Hydromatic milling machine bed after welding. Note bracing and ribbing.





o o o

AT LEFT

FIG. 5—Front view of special welded steel Hydromatic milling machine. Only the table is of cast iron.

o o o

to think in terms of steel requires extra effort. He has to strive to keep from thinking in terms of cast iron and then building the product of steel. It is like a foreign language, one does not become really proficient in speaking a foreign language until he learns to think in that language rather than think in his own, then translate it into the other language.

Appearance Important

Just as the early automobiles had whip sockets, so early efforts in the use of steel construction were along the lines of copying cast-iron structures or of going to extremes in box construction. We now recognize that just because a method of design or a style was good when applied to cast iron, it does not follow that steel is applicable in a like manner. True, some manufacturers demand cast-iron shapes for appearance sake and they get them in steel, but they pay the price and that price is not low. Times are changing; new shapes, lines, appearances, styles are with us. They may seem harsh and strange to us today, yet some of them will be the pace setters of tomorrow's styles. With as versatile a method of manufacture as welding available, we certainly cannot be content to build steel machines with lines and styles that looked up-to-date yesterday.

We feel that the proper thing to do is to establish styles and appearances that fit into the proper use of fabricated steel structures. Figs. 1 and 2 are excellent examples of the possibilities along this line. This machine combines castings and welded steel to make a special purpose machine which, while not conventional, certainly is not displeasing to the eye.

We find in such machinery as this, that the shape, the lines, the massive suggestion of power, or rigidity is so definite, so positive that it gives one faith in the finished machine tool. You feel that it will function to your satisfaction.

Large Centerless Grinder Built of Welded Steel

A full realization of the inherent possibilities of welded steel fabrication, so far as our company is concerned, came after we designed and built the large Cincinnati No. 6 centerless grinder of welded steel. This is a precision centerless grinding machine finishing pistons, for example, to limits of 0.0002 in. for size and roundness. The former cast-iron machine of the same design weighed over 9600 lb. for the main frame units alone which consisted of two pieces.

This grinding machine was made in two sections because of the lack of equipment to handle large work. Even at that, it was not a good casting to cast or machine. The up-to-date steel counterpart weighs 6600 lb. and is, of course, in one piece. This machine is producing finishes of the highest type at an extremely rapid rate of stock removal.

One application of these grinding machines employs 36 in. diameter wheels, 30 in. wide, driven by a 100 hp. motor. The performance of this machine is excellent and there has never been any problem of chatter, vibration or any of the other kindred ills sometimes attributed to welded steel machine tools.

Figs. 1-3 show how this grinder is built up. The careful placing of metal exactly where it is needed should be noted, also the pleasing lines obtained by cold bending. This structure is worked out so that it is extremely rigid, yet its weight is moderate, and we are able to produce it with a saving in weight and cost.

Welded Steel Milling Machines

What can be done with welded steel milling machines, where vibration is especially serious and where the aver-

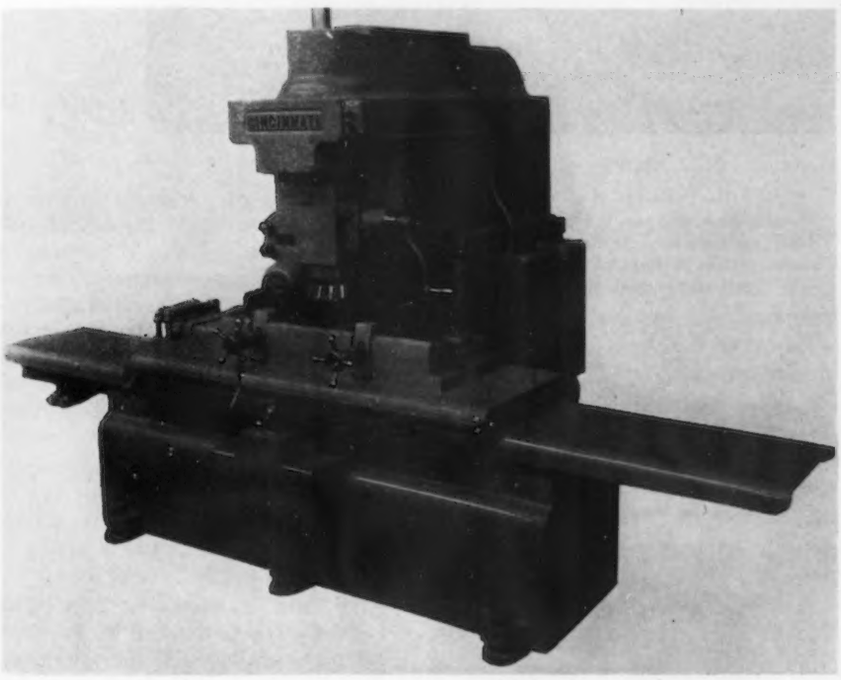
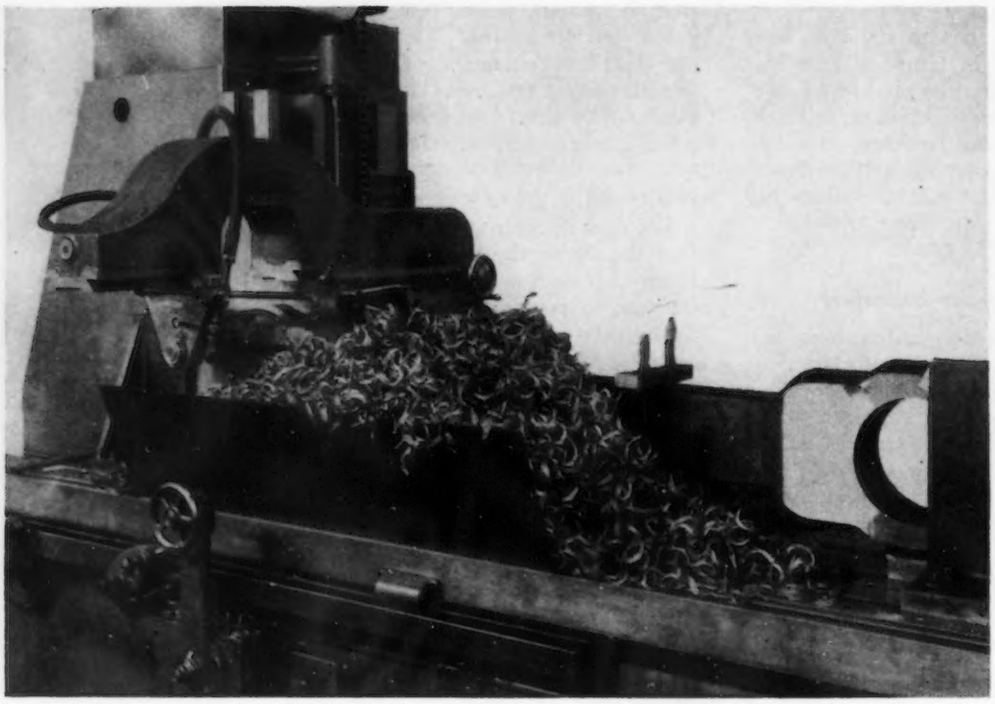


FIG. 7—Completed Hydromatic milling machine, the base of which is shown in Fig. 6. Consists of cast iron spindle carrier with intricate ribbing and brackets, steel spacer, steel bed, and steel table.

FIG. 8—Upside-down view of Hydro-Tel milling machine base, showing rib construction prior to placing of the bottom plate.



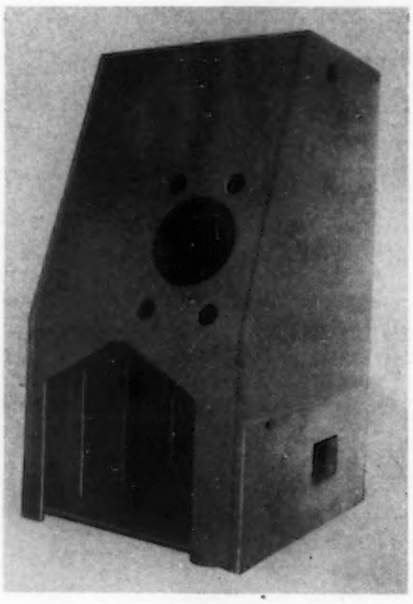
ABOVE

FIG. 10—Showing the Hydro-Tel, consisting of a welded bed, column and special steel rectangular overarm, making a type of cut prone to set up unusual vibration.

o o o

BELOW

FIG. 9—Hydro-Tel headstock showing finished painted structure prior to machining.



age milling cut would tend to set up chatter? This problem is especially serious where intermittent cuts are to be made using one or more large inserted blade mills.

Well do we remember one of our early efforts to fabricate a steel rail. It was to be used to carry standard spindle carriers for a used milling machine which we rebuilt for a customer. The vibration in this steel rail was terrible, the distortion under the cut was a disgrace, yet with it all the distortion was constant and the machine ran a full year. During this time we had learned much and when this machine was returned for rebuilding some of our problems and errors were better understood and the answers were ready. Even so, when considering the rebuilding of this machine a cast-iron rail was deemed best.

However, the excessive overhang, the insufficiently supported heads, the internal ribbing were all radically modified. In other words, the features that were really responsible for most of the trouble with the steel rail were properly taken care of when the rail casting was made. In the future, we would make that rail of steel (as we have numerous others) and know before we built it that it would be satisfactory, that it would weigh less than the cast-iron rail, and its construction of steel would carry all the interlocking advantages that come from the fabrication by welding of this type of structure.

More recently, we built a special Hydromatic milling machine with four spindles for milling the seven surfaces of a small two-cylinder engine block. Figs. 4 and 5 show this interesting machine tool.

Fig. 4 is of particular interest because it shows intricate bracing used for additional rigidity. A number of shafts and large gears go into the compartment shown. The large steel casting is the spindle carrier proper. By use of this and the other three steel castings also shown, elaborate burning, welding and milling operations are eliminated.

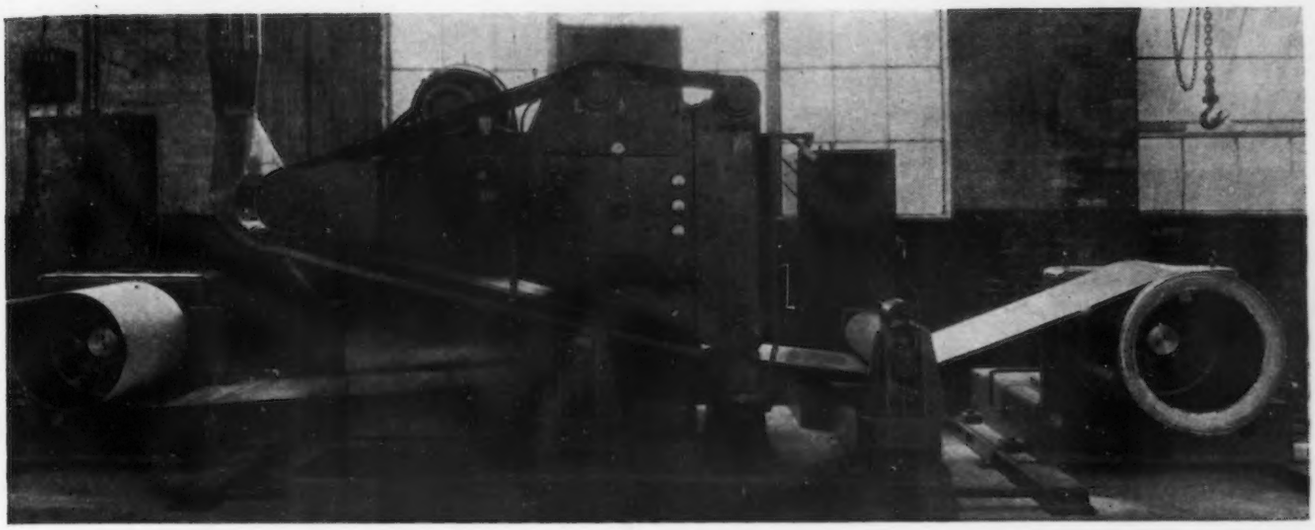
Fig. 5 is a view of the complete Hydromatic milling machine. We feel that this is a good looking machine tool and are told that it is giving excellent results.

In order to know just how rigid a welded machine tool can be, three very accurate reading dial indicators were placed on the outer corner of the fixed height rail carrying the vertical spindle carriers. The deflection readings were extremely low, definitely less than we could hope for on a machine with a cast-iron rail designed for similar work. The skeptics within our own organization, needless to say, felt much better about welding after this demonstration proved that a machine of welded steel was indeed very rigid. Further, a careful analysis as to the source of the small deflection we did find, taught us some things which will enable us to produce a similar machine lighter in weight and yet more rigid.

Hydro-Tel Milling Machine

Figs. 8, 9 and 10 illustrate an excellent example of a large welded Cincinnati horizontal Hydro-Tel milling machine. This machine which is of

(CONCLUDED ON PAGE 70)



A New Strip Grinder . . .

BEHR-MANNING CORP. of Troy, N. Y., has just installed in their plant a complete strip grinding and polishing unit for use with coated abrasive paper or cloth belts. This is the second unit this company has installed in the last 15 months for experimental and demonstration purposes, and it represents many new features as well as an entirely new design. It has a capacity for strip up to 30 in. wide.

The grinding and polishing unit, built specially by the Hill Clutch Machine & Foundry Co., of Cleveland, includes a new automatic compressed air control for belt alinement; an automatic pressure control for grinding or polishing which permits a positive setting for fine grinding or polishing; an air control pressure for rough grinding and maximum stock removal wherein the head may float over irregular surfaces; and an air actuated head which quickly makes or breaks the contact between the belt and the strip.

The passage of strip through the machine is at all times electrically under the control of the operator, all controls being mounted in the machine head within easy reach. A combination of reels by the Broden Construction Co. and a special circuit, controls, motors and motor-generator by Reliance Electric Co. and Clark Controller Co. complete this unit.

This set-up provides constant tension in nine steps from 200 to 8000 lb. as required, depending on the gage and width of steel and may be regulated instantly while the machine is in operation. Likewise, the speed of the strip may be regulated to anything from seven to 35 ft. per min. in the first stage or 30 to 150 ft. per min. in the second stage. In either range, the change may be made while the machine is in operation.

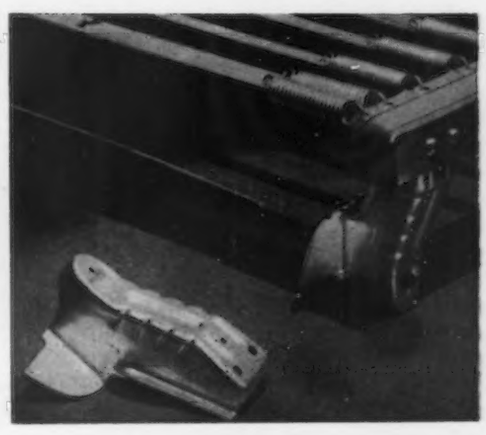
It is so designed that the operator has access to, and a clear vision of the strip entering the grinding area, to permit any necessary lubrication of the surface and to detect surface imperfections which may require extra grinding. In such cases, the strip may be instantly reversed, maintaining tension and speed merely by throwing a reversing switch, and this may be repeated until the imperfections have been removed.

The grinding unit may be used in conjunction with any type of reel with friction drag, but the electrical control for strip speed and tension, it is claimed, is more positive and smoother in operation. This machine may be used for grinding hot or cold rolled strip in the heavy gages or for polishing down to 0.005 in.

Its purpose is to reclaim stock which because of surface imperfections cannot otherwise be satisfactorily rolled out; to improve cold rolled finishes and to produce a fine ground surface to match standard sheet finishes.

The Behr-Manning Corp. is inviting all manufacturers of, or fabricators using strip steel or other metals or alloys, to see a demonstration of this new equipment.

A STAMPED steel riser bracket or corner block for bedsprings has been developed by the Wrought Washer Mfg. Co., of Milwaukee, to replace the malleable iron casting previously used for this application. Said to be superior in strength and rigidity to the older type, this intricate stamping is more economical than the malleable iron unit of like capacity.



An Eight-Spindle Automatic and

A NEW eight-spindle automatic bar machine offering fast feeds, independent control of cross slides, retracting stock feed stop, high spindle speeds and other features is announced by the *National Acme Co.*, Cleveland. These new Acme-Gridley "eights," with capacity from 9/16 to 2⅝ in., have essentially the same spindle carrier and tool slide design which has been used on the four and six-spindle automatics. A departure from the practice of mounting feed gears on the front side of the machine and spindle speed change gears on the end, however, is found in the new interchangeable feed and speed change mechanisms, all mounted on the motor end of the model RA-8.

In addition to the eight tool slides on the octagon mounting barrel, there are six side slides provided that move on hardened steel ways with adjustable gibs. All cam and roll contacts to these slides are short, resulting in direct tool action, with freedom from chatter. Each standard slide has a stop which engages a stop on the periphery of the spindle carrier, for control of forming sizes. The drive system for a set of three of these slides is illustrated.

The stock reel is power indexed independently. The front disk of the reel turns in a guide mounted directly in the end of the pan. One end of the stock feeding mechanism is fastened in the headstock frame, and the other end, including the front of the stock reel, is held in the arch support rising from the rear end of the pan. Two large steel shafts carry the chucking and feeding slides on long bearings and prevent tipping or binding. The guard which encloses the spindle drive gears also acts as a guard to hold the spools in position, thus preventing chuck release while the tools are at work.

Provision is made for the independent mounting and driving of a wide variety of standard and special attachments. High speed drilling attachments can be used in all eight spindle positions. Threading and tapping attachments are arranged for use in either of the two top spindle positions, or both. The same slide and operating mechanism in either of these positions can be used for accelerated reaming or turning operations.

NATIONAL-ACME has brought out an eight-spindle bar machine designed along lines similar to its four- and six-spindle models. Other announcements of the machine tool builders include a precision boring machine spindle with arrangement for retracting the tool when backing off, a sensitive drill, two popular priced pedestal grinders, a tiny tool post grinder for lathe application, a low-priced bench lathe with power cross feed, and a special turret lathe chuck for doing angular work on valves and fittings in one set-up. A roll foundry has built a large roll lathe for its own use. Also included in this review are an assortment of portable electric and air driven tools brought out in recent months.

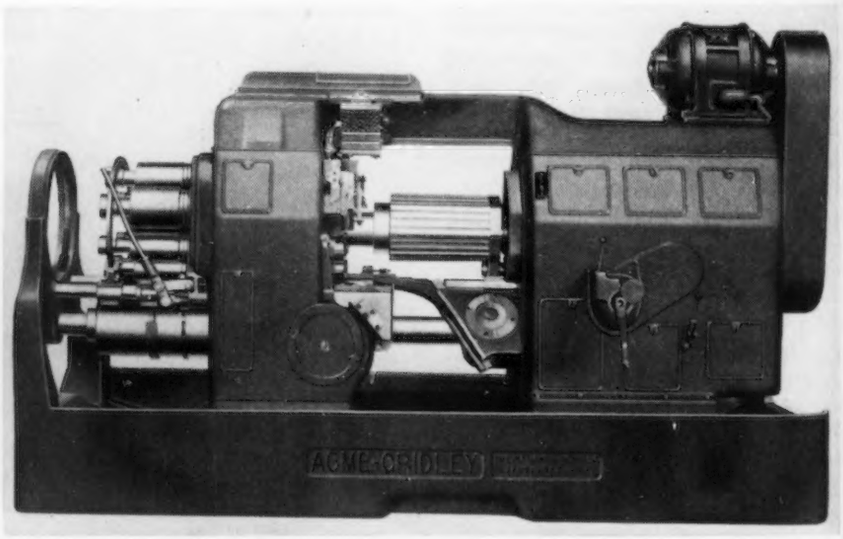
o o o

Installation of a standard chip conveyor is provided through bolting to the rear end of the pan. The conveyor is driven from a cam drum on the end of the main drum shaft through levers to a plunger and sprockets.

Retractable Precision Boring Spindle

A NEW precision boring spindle which retracts the tool from contact with the work on the return stroke has been introduced by *Ex-Cell-O Corp.*, Detroit. Designed for precision boring operations where extreme surface finish is desired, the new spindle is designed to the same installation dimensions as standard Ex-Cell-O boring spindles. The retracting action is obtained through a combined hydraulic and mechanical mechanism. The spindle proper is hollow with a shaft slidable endwise within the hollow spindle, actuation being by a small hydraulic piston and cylinder. On the end of the spindle is located a tool-carrying quill, assembled in such a manner that it can be moved at right angles to the spindle axis within small limits.

Within the quill are two opposed hollow tapers, one machined a small



STRIPPED view of the new eight-spindle Acme-Gridley automatic bar machine, known as model RA-8, with capacities of 9/16 to 2⅝ in.

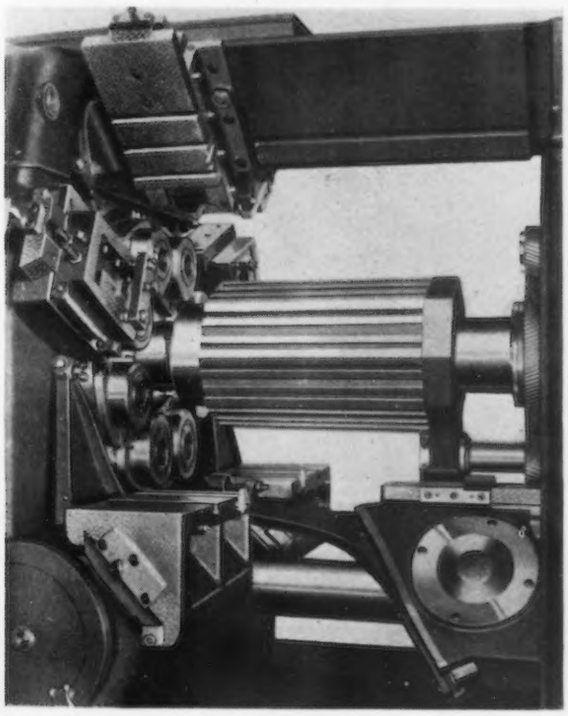
Other Machine Tool Developments

amount off-center. When the hydraulic piston pulls the shaft back through the spindle, this movement is effective in centralizing the quill on the same axis with the spindle, and locking the two in cutting position. When the hydraulic cylinder pushes the shaft forward through the spindle, the shaft engages the reverse off-center taper toward the front of the quill, resulting in retracting the tool from the work.

By FRANK J. OLIVER
Associate Editor, The Iron Age

o o o

the sensitiveness required to put the feel into drilling through rigidity in design and accurately machined parts, combined with New Departure grease sealed ball bearings. Four spindle



AT LEFT

THE same design principles of fixed tool slide, in this case octagon shaped, and revolving spindles in an indexing stock reel are retained in the model RA-8. The slide coming up at an angle at the lower right is the stock stop mechanism operated by pinion and rack direct from the main drum shaft. The six side slides can also be seen in this view.

o o o

AT RIGHT

ARRANGEMENT of drum cams used to actuate three of the side slides in the eight-spindle Acme-Gridley bar machine.

In operation, the starting of the machine feed also actuates the hydraulic cylinder. Operation of the hydraulic cylinder is completely automatic through the provision of limit switches and an electric relay, interconnected with the hydraulic operating unit of the machine.

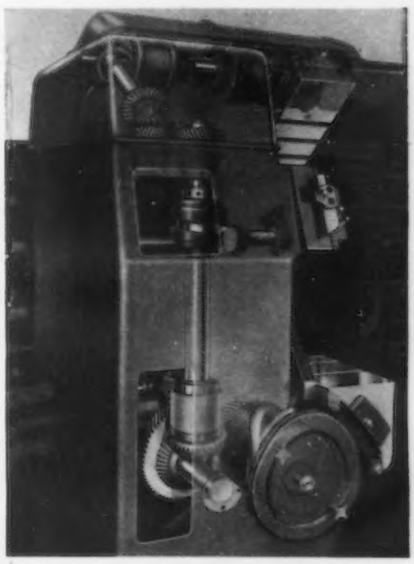
Sensitive Drill

THE Redin No. 0 sensitive drill made by the *Crescent Mfg. Co.*, 1104 Tenth Street, Rockford, Ill., has speeds, from 900 to 5000 r.p.m., are provided by a rolling wedge transmission in which the pressure is automatically adjusted to the resistance of the work. Wear is said to be practically eliminated because of the rolling contact. Drive is by a vertical mounted, built-in ½-hp. motor, and drilling capacity is up to 5/16 in. in mild steel. A No. 30 Jacobs chuck is standard equipment.

Other specifications of the unit are: table size, 10 x 12 in.; spindle to column, 6½ in.; spindle travel, 3⅜ in.; and traverse of sliding head, 5¼ in.

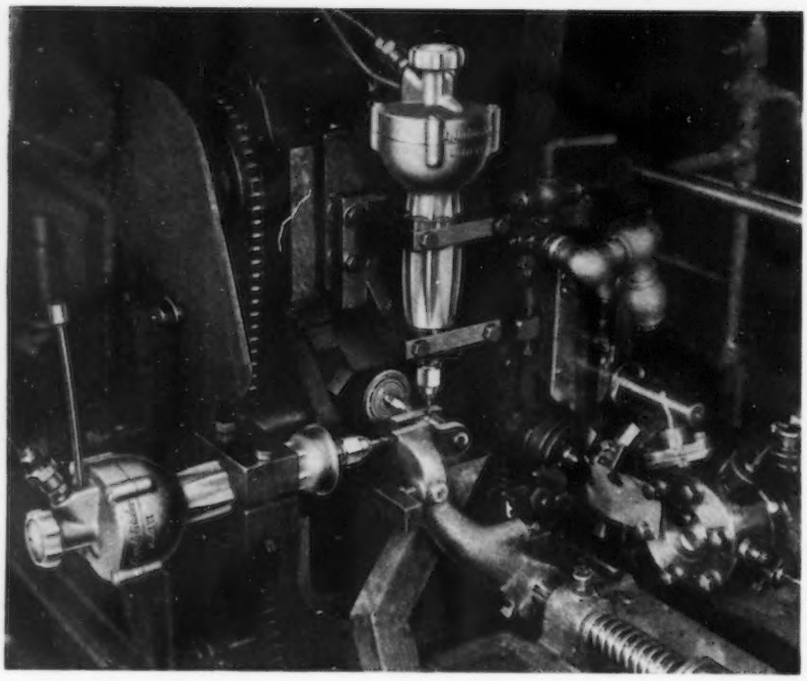
Pedestal Grinders

TWO new lines of popular priced pedestal type grinders have been placed on the market in the past month. The *Hisey-Wolf Machine Co.*, Cincinnati, has brought out a line of Hisey "Economy" grinders and buffers in 13 different models from ¾ to 5 hp.



capacity. The grinders feature totally enclosed motors, adjustable wheel guards, dust-proof ball bearings and tool tray and water pot on all but the small bench models. The larger horsepower machines have spark shields, push button starters and overload protection. Grinding wheels are not furnished. The buffers have similar features and may be had with motors of either 1800 or 3600 r.p.m. Grinder speeds depend upon the wheel size capacity. The 2-hp. size illustrated, with 12 x 2 in. wheels, is priced at $165.

THE Cadet 12-in. ball bearing pedestal grinder, offered by the *Standard Electrical Tool Co.*, 1946

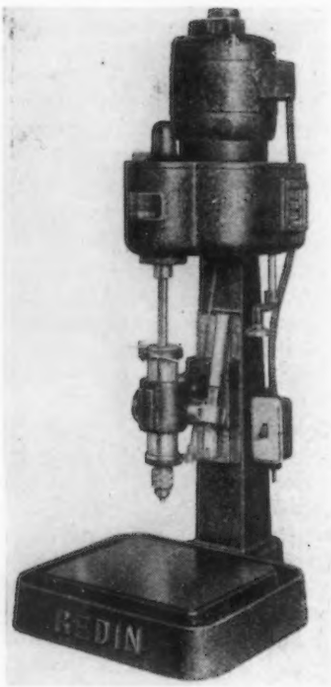


o o o

AT LEFT

THROUGH the application of three Madison-Kipp air grinders to an automatic screw machine, cross drilling of small holes can be accomplished during the regular machine cycle, without requiring any extra time. In the set-up shown, taken from the Detroit Lubricator Co. plant, the piece is picked up by the transfer arm as it is cut off and is carried to a special jig. Two of the Kipp air grinders are mounted in the vertical and back position in slides actuated by a cam driven by roller chain and pinions off the main camshaft. The third air grinder, shown at the left is held on a bracket attached to the cross-slide of the machine and the drilling is done during the forming operation on the next piece. The air grinders used as drills are not affected by splashing oil and can be run on the regular shop air pressure of 60 to 80 lb. per sq. in.

o o o



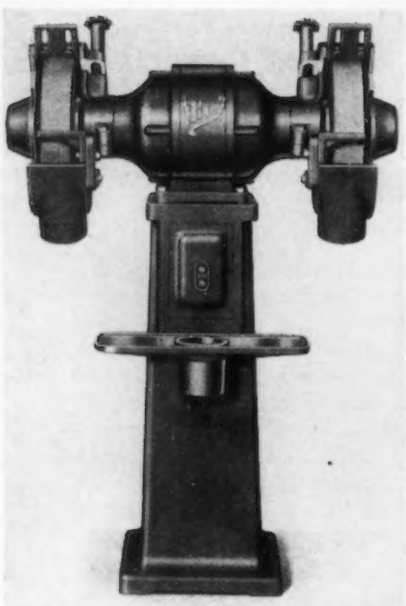
ABOVE

THE Redin No. 0 sensitive drill employs a built-in motor drive through a rolling wedge four-speed transmission.

o o o

AT RIGHT

ONE of the new line of Hisey Economy grinders, this being the 2-hp. size for 12 x 2-in. wheels.

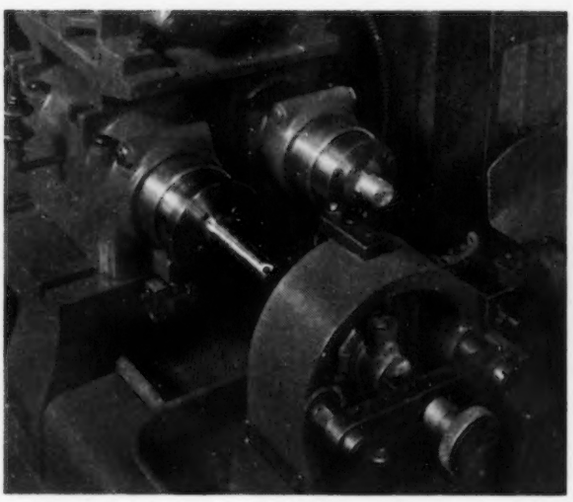


o o o

AT RIGHT

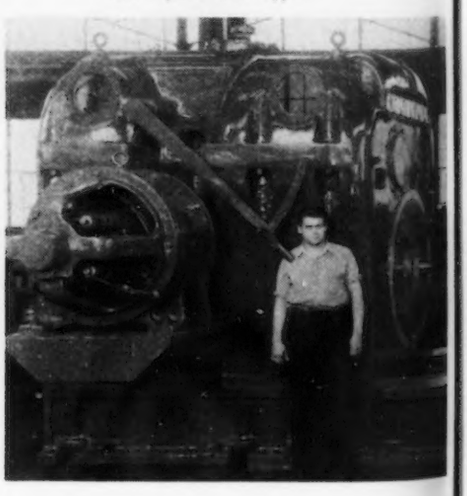
CLOSE-UP view of Ex-Cell-O precision boring machine with retracting-tool spindle, left, shown boring a fuel pump body. The spindle at the right carries a chuck for fuel pump pistons which are turned on the o.d. by tool blocks at right of body fixture.

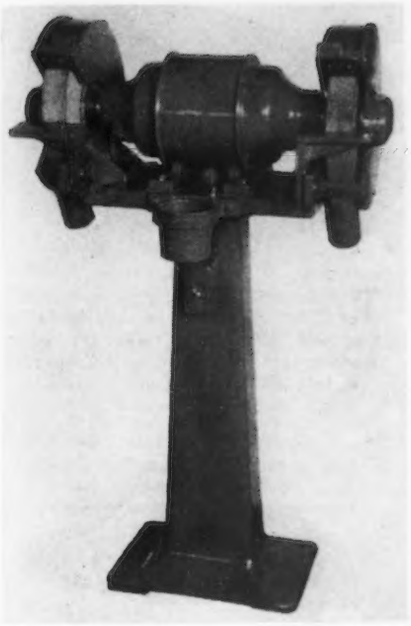
o o o



BELOW

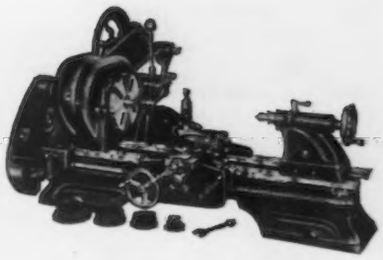
THIS immense Continental roll lathe as it stands can swing up to 48 in. diameter, but is adjustable to swing up to 60-in. diameter rolls. Driving motor is a 50-hp. 300 to 1200 r.p.m. d.c. type.





ABOVE

THE Cadet 12-in. pedestal grinder is powered by a totally enclosed 1750 r.p.m. a.c. motor, ball bearing mounted.



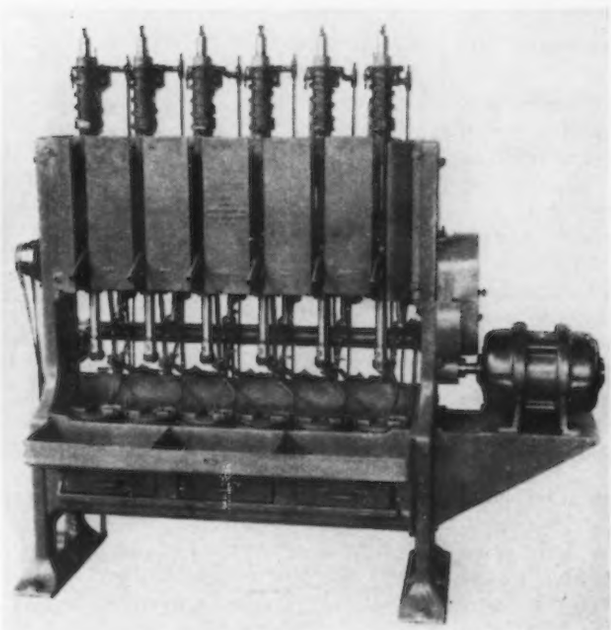
AT RIGHT

POWER cross feed will be furnished as standard equipment on the new series F 10-in. precision bench lathes announced by the Atlas Press Co., Kalamazoo, Mich. According to the builder, this is the first time this feature has been incorporated in a popular priced bench lathe. (The 36-in. swing size sells for only $105.) Main bearings are babbitt, and the bed ways are ground. Cross feed is driven through bevel gears off the lead screw. Carriage is of two piece construction. Drive from cone jackshaft is by V-belt.

o o o

BELOW

THE use of quick-acting, automatically operated air-chucks, together with power actuated vertical movements of the spindles, has greatly speeded up the production of the new six-spindle pipe coupling tapper, announced by the Acme Machinery Co., 4537 St. Clair Avenue, Cleveland. Production is stated as 1250 ¾-in. couplings per hr. Scroll air-chucks are automatically closed and opened with the downward movement of each spindle. Spindle feeds are provided with oil check valves which makes it possible to cushion the spindle feed on the downward stroke. The new machines have a work capacity range of from ⅛ to 1¼ in. pipe couplings.

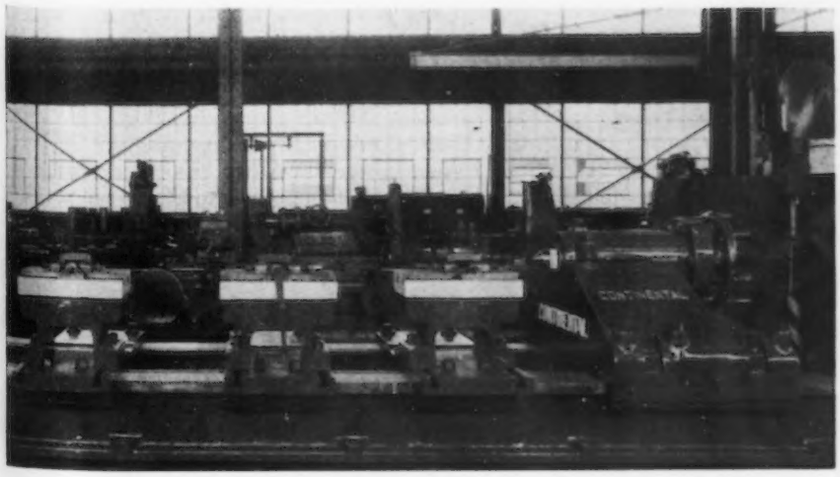


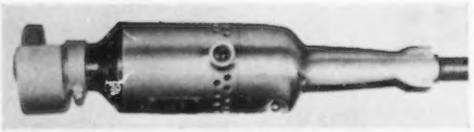
ABOVE

SEVEN position fixture designed for machining gate valves and pipe fittings in one chucking on Gisholt 3AL, 4L or 5L heavy duty turret lathes.

AT RIGHT

THE Brown & Sharpe No. 212 centrifugal Motor-pump is particularly suited for supplying coolant for machine tools and similar applications where a large volume is required at low head and where dirt and abrasive may be present in the liquid. Pump is driven by a fully enclosed ½-hp. motor with grease sealed ball bearings and stainless steel integral pump shaft. Impeller, of the open type, hydraulically balanced, is of aluminum bronze. Discharge pipe connection is 1¼ in. Motor may be had in any of the standard voltages, from 110 to 550 volts. The unit is designed to be mounted in a tank with a maximum depth of 11 in. from bottom of feet.



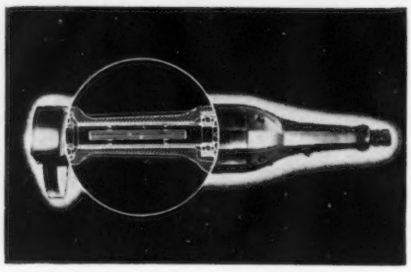


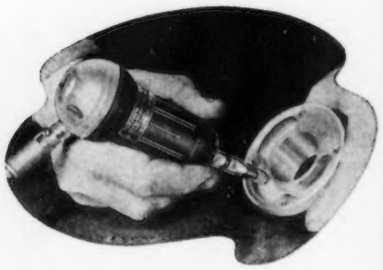
NEW Black & Decker 2½-in. high speed, light weight portable grinder, with no-load speed of 19,000 r.p.m.

o o o

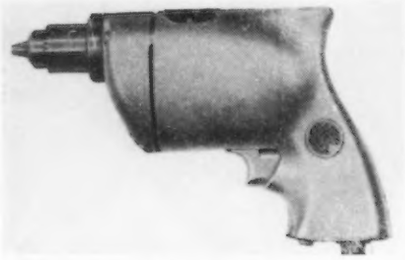
BELOW

WHEEL vibration is prevented from being transmitted to the motor by resilient steel strips in the new Thor portable electrical grinders, made in three sizes of 4, 5 and 6-in. wheel capacity.

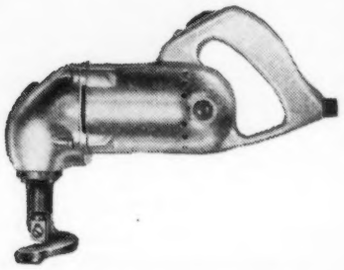




THE Onsrud B-1 air grinder, with speed of 75,000 r.p.m., can be used for rapid tool and die grinding and also as a marking tool for writing on all types of metals, plastics, glass and porcelain.



THE Black & Decker Holgun, a compact, powerful portable electrical drill with pistol grip and trigger switch, is a heavy duty production unit with ¼-in. capacity in steel.



THE Black & Decker 50-LS Lectro-Shear is a high-cycle tool capable of cutting 16-gage sheet steel. Operates on 220-volts, 3-phase, 180-cycle circuit at a speed of 2000 strokes per min. Net weight, 8¼ lb. Minimum cutting radius ¾ in. Cutting shoe can be inserted in a 2-in. hole for inside cutting. Motor and crankshaft mounted on ball bearings, with bronze eccentric bushing.

West Eighth Street, Cincinnati, was developed to provide a low-priced machine of substantial construction. Priced at $144, it is ball bearing equipped and has capacity for 12 x 2-in. grinding wheels. The wheel guards are of the safety type, adjustable to the wear of the wheel. Each guard has exhaust outlet, adjustable spark breaker and tool rest. This machine is available for a.c. circuits only and includes a three-pole toggle switch.

Large Roll Lathe

A RADICALLY changed roll lathe has been developed and is now in use at the East Chicago, Ind., plant of the *Continental Roll & Steel Foundry Co.* Originally built for its own use, the lathe will probably be offered in lighter form for general mill use at a later date. In this machine, the usual protruding faceplate is concealed flush with the headstock housing, with only the dog lugs extending beyond the face. The overhung pinion is replaced by a double helical pinion gear of generous proportions, carried on roller bearings on each side. A double helical gear, also mounted on roller bearings, takes the place of the customary internal gear. Two speed changes are obtained by back gears. Pressure lubrication is supplied the gears, which may be observed in operation through an inspection window and the aid of permanently installed interior lighting.

Redesigning the tailstock in keeping with the headstock resulted in changes that aid in centering of the roll, while lateral movement accommodates various lengths of rolls. Headstock is driven by a variable-speed d.c. motor. Traversing of the rest bars or carriages is by hand.

Turret Lathe Chucking Fixture

A SEVEN-POSITION indexing fixture having angular positions of 0, 45, 90, 180 and 270 deg. and two positions of approximately 3-deg. off center, held to an accuracy of .1 sec. of arc, is being marketed by the *Gisholt Machine Co.*, Madison, Wis., for use in machining T's, L's, crosses, and valve bodies of various sorts, including gate valves, on its heavy duty turret lathes. The capacity of this fixture is for holding 2 to 5-in. valve and pipe fittings, and the unit is designed for customers' requirements. The fixture is heavily constructed of cast steel and bolts directly to the flanged spindle nose. The cradle is mounted in ball bearings and is locked in any desired indexing position by a hardened steel pin. The castings are automatically located on center in hardened steel locating pins in jaws that are actuated by turning a wrench in the bottom of the fixture. In the operating position, clamping plates bind the cradle and must be released for indexing.

Portable Power Driven Tools

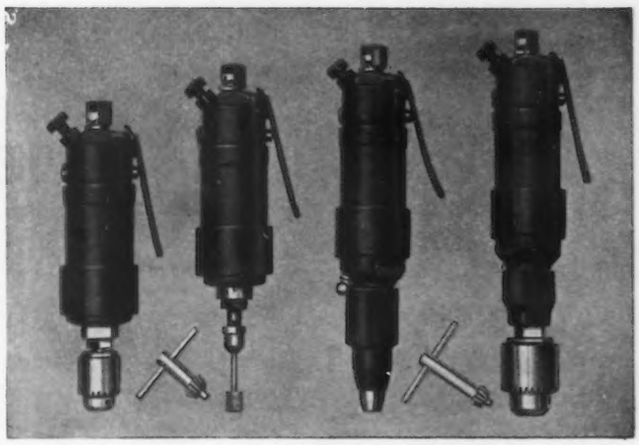
TWO completely new high speed portable grinders with wheel size capacities of 2 and 2½ in. have been announced by the *Black & Decker Mfg. Co.*, Towson, Md. These are precision tools, having a no-load speed of 19,000 r.p.m. and weighing 3½ and 4½ lb. respectively. Length is 13½ in. for both sizes.

IN a larger range of wheel sizes, from 4 to 6 in., the *Independent Pneumatic Tool Co.*, 600 West Jackson Boulevard, Chicago, is offering Thor portable electric grinders with a shock absorber spindle to absorb vibration. The spindle is a two-piece shaft joined with resilient steel strips which effectively prevent wheel vibration from reaching the motor, the life of which is thereby greatly lengthened. The 4-in. grinder, known as the Thor U54, weighs 10 lb. and is 19 in. long. The 5-in. grinder, U55, is for heavier duty work and operates at a lower speed, 4500 instead of 6000 r.p.m. In

THE Stearns high duty portable drill stand magnet makes it possible to spot the tool in almost any conceivable working position since the magnet base has a pull of 900 lb.

AT RIGHT

THE Cleco No. 9 series portable air tools made by the Cleveland Pneumatic Tool Co., 3734 East 78th Street, Cleveland, are intended for light manufacture in wood or metal. At left is the No. 9G with 1/8 in. collet chuck for small mounted emery wheels, such as the one shown to its right. Speed 20,000 r.p.m. Third from left is the No. 9S screw driver, with 3/16-in. bit with finder. At right is the No. 9D drill with 1/8-in. Jacobs chuck. No. 9N, not shown, is a nut setter with snap-on chuck having a 9/32-in. square hole. Except for the grinder, operating speed is 2100 r.p.m. These tools weigh 1¾ lb. each.



size and weight it is about the same. The 6-in. grinder, the U60, weighs 20 lb. and is 24½ in. long. It is for the heaviest kind of duty, with a free speed of 6000 r.p.m.

AT the other end of the size scale is the B-1 air turbine grinder, with free speed of 75,000 r.p.m. for use with very small wheels, a product of the *Onsrud Machine Works, Inc.*, 3900 Palmer Street, Chicago. This unit has a 1/6-hp. turbine motor operating off the shop air line and consuming 5 cu. ft. of air per min. The ½-in. spindle is carried on ball bearings and is hollow for oiling. A ⅛-in. chuck is provided, also an Onsrud writing stick, having either aluminous oxide or silicon carbide abrasive enclosed in a soft steel casing. With this stick, hard or soft materials may be marked as easily as writing with a pencil. Weight of the whole tool is only 12 oz.

Electric Drills

HOLGUN is the name given a compact electric drill recently announced by *Black & Decker*. Although only 6¾ in. in overall length, and weighing only 2¾ lb., it has a capacity for drilling ¼-in. holes in steel on a continuous production basis. Anti-friction bearings are used throughout, and the spindle gear has a splined mounting on the heat-treated spindle shaft. Three screened inlets provide ample ventilation for the universal type motor.

A SET of tiny portable electrical tools that were primarily designed for the home workshop are finding their way into industrial plants for many "trick" uses. This is the No. 250 home drill and grinder kit, made by the *Speedway Mfg. Co.*, 1834 South Fifty-second Street, Cicero, Ill. The drill is about the size and weight of a small pocket revolver. It operates at 1000 r.p.m. and is rated for ¼-in. in steel. The grinder is about the size of an apple and fits comfortably into the hand. It operates at 20,000 r.p.m. In design and finish the new Speedway miniatures are strictly modern. The kit includes a steel case and five accessories. Two collets are furnished with the grinder, 3/32 and ⅛ in., while the drill has a ¼-in. chuck.

TOYLIKE in size, weight and price, the Speedway No. 250 Home drill and grinder kit is finding its way into industry to take care of the occasional "trick" job.

THE Stanley W8 safety saw comes packed in a metal carrying case with one combination rip and cross-cut blade and ripping gage, wrench, lubricant and heavy rubber covered, three-wire cable.

Drill Stand Magnet

THE usefulness of the average portable electric drill stand can be increased considerably by the use of a high duty magnet developed for this service by the *Stearns Magnetic Mfg. Co.*, Milwaukee. The Stearns portable drill stand magnet is 8½ in. in diameter, consumes 80 watts, and weighs 40 lb., but has a pull of 900 lb., providing an ample safety factor, whether the drill is operated horizontally, upside down or at any angle. The drill stand can thus be spotted in almost any conceivable position where drilling, tapping, reaming, hole sawing, nut running and similar operations are required.

Woodworking Saw

A HEAVY duty portable electric safety saw is the W8 made by the *Stanley Electrical Tool Division*, New Britain, Conn. It cuts straight through 2⅞-in. lumber and bevel cuts up to 2 1/16 in. at 45 deg. Its universal motor draws 9.5 amp. at 110 volts, full load. The duplex handle, a Stanley feature, makes the saw easy to handle in any position. Switch can be operated independently by either of two triggers located on the handle. Housing is heat-treated aluminum alloy. Gears are a ground alloy steel worm and a bronze worm wheel running in a large grease chamber.

Selecting Furnace-Brazing Metals

THIS is the seventh of the series on electric-furnace brazing, begun by Mr. Webber in THE IRON AGE of Sept. 8. Previous articles dealt with why and where the process is used; methods of holding and supporting assemblies; explanation of capillary attraction and wetting action; and methods of limiting creep and of applying furnace-brazing metals, respectively.

o o o

SELECTION of the most suitable brazing metal, and the form in which it is to be applied, depends upon a number of factors. For instance, it is possible to furnace braze assemblies made of practically any ferrous or non-ferrous metal if suitable procedure is followed, and if care is taken to choose a brazing metal which:

1.—Melts and flows at a temperature somewhat lower than the melting point of the parent metal.

2.—Wets the parent metal.

3.—And is so placed that it will be able to creep throughout the joint.

Representative metals which can be electric-furnace brazed in controlled atmospheres, some with ease, others with a little difficulty, are:

S.A.E. standard steels
- Carbon steels
- Screw stock
- Steel castings
- Nickel steels
- Nickel-chromium steels
- Molybdenum steels
- Chromium steels
- Chromium-vanadium steels
- Tungsten steels
- Silico-manganese steels

Gray cast iron
Malleable cast iron
White cast iron
Tungsten-carbide alloys
High-speed steel
Monel metal (68 Ni – 29 Cu – 1.5 Fe – 1.1 mn)
Adnic (70 Cu – 29 Ni – 1 Sn)
Cupro nickel (70 Cu – 30 Ni)
(80 Cu – 20 Ni)
(etc.)
Copper
Nickel
Brass
Bronze
Sterling silver
Nickel silver

Although a wide variety of brazing metals can be used under suitable conditions, perhaps the most common ones employed at present for furnace brazing are:

1.—Copper, which melts at 1982 F.

2.—Brass, such as 60 cu – 40 zn or 70 cu – 30 zn, which melts at about 1650 deg. F. and 1750 deg. F. respectively.

3.—"Sil-Fos" silver-brazing alloy, which melts at 1300 F.

4.—"Easy-Flo" silver-brazing alloy, which melts at 1175 F.

Copper is generally used as the brazing metal wherever possible because it flows so freely and gives such strong, clean, joints. A flux is not needed to help it flow, except on parent metals difficult to wet. For example, copper generally wets low-carbon steel easily, but chromium, manganese, silicon, vanadium, aluminum, and zinc, included with parent metals, form selective oxides when exposed to impurities in the furnace atmosphere at elevated temperatures, and these oxides can only be reduced by means of a solvent flux. If the constituents named should total in excess of 1 or 2 per cent in the parent metal, a flux might be found necessary. Naturally the flux is avoided wherever possible because it is a nuisance to apply and then to clean off after brazing. It should be added here perhaps that nickel, because of its great affinity for copper, encourages the wetting action and is a favorable element to include in the parent metal.

Brass, which melts at a lower point than copper, is sometimes used as a brazing metal. It generally requires a flux coating to help it flow, it being necessary to clean up zinc oxides which tend to form on its surfaces. If the brass can be embedded within the joint the flux can sometimes be avoided. The varying melting point of brass, caused by distillation and loss of its zinc, is sometimes a troublesome factor in furnace brazing.

Silver Brazing Alloys

Sil-Fos, an alloy of copper, silver, and phosphorous, is self-fluxing on copper and flows freely at low temperatures. It is recommended for certain non-ferrous parent metals such as copper, brass, and bronze, on which it gives strong, ductile joints. It is not suitable for ferrous metals, because the iron phosphide formed by the phosphorous and iron is extremely weak and brittle.

Easy-Flo, an alloy of copper, silver, zinc, and cadmium, is the lowest-melting silver-brazing alloy available at present, and is suitable for either ferrous or non-ferrous metals. It is almost always used with a special low-melting flux called "Handy" flux. It makes high-strength bonds, and is quite satisfactory, particularly on products which for one reason or another cannot well withstand elevated furnace temperatures, such as non-ferrous metals, cast iron, or stainless steel.

Sil-Fos and Easy-Flo silver brazing alloys, and Handy flux, can be obtained from dealers in brazing supplies, or direct from the manufacturer, Handy & Harman, 82 Fulton Street, New York.

The electric-furnace brazing of non-ferrous metals, with brazing-metals of low-melting non-ferrous alloys, sometimes requires careful control of time and temperature. There are limitations because of the rapid absorption of the brazing metal by the parent metal, and vice versa, which restricts the distance of flow, and sometimes causes a "chewing" action in the parent metal. Also, limitations are imposed by the unstable flow point of such brazing metals because of selective melting, and the distillation of the volatile constituents such as zinc. To keep within these limita-

and Fluxes . . .

By H. M. WEBBER

Industrial Department, General Electric Co., Schenectady, N. Y.

(With Notes on Venting of Hollow Bodies)

tions, and to get rapid heating and cooling, fairly thin and uniform sections of parent metal are desirable. The brazing metal, in such cases, should be so located that the required distance of flow is small. Loose, rather than tight, fits generally give better flow. Easy-Flo silver brazing alloy is relatively free from the limitations named above, because of its exceptionally low melting point.

Use of High Temperature Gradient

Sometimes a high temperature gradient, or difference between the temperature of the furnace and the maximum temperature reached by the assemblies passing through the furnace, can be employed to gain advantages of quick heating such as rapid and thorough penetration of the brazing metal and a high rate of production. The use of a high temperature gradient is generally restricted, however, to assemblies that are uniform in section so that all parts will heat uniformly and no part will exceed a safe temperature for either the parent metal or the brazing metal. Sometimes even higher gradients than those indicated in table 1 herewith can be employed successfully. For example, hollow nickel-silver knife handles are commonly bonded with low-melting silver-brazing alloys using furnace temperatures of 1800 deg. F., although the assemblies themselves do not exceed 1300-1400 deg. F. as a result of proper control of their time within the heating chamber and the fact that they heat evenly and rapidly.

When brazing assemblies made of brass, some distillation of zinc from the parent metal is to be expected, which results in a surface coating of zinc or zinc oxide plus a residue from the flux needed to assure wetting by the brazing metal. If it is desired to restore the assemblies to their original lustre, a hot-water wash and pickle will be required. Because of the necessity of cleaning the brass assemblies after furnace brazing even though a protective atmosphere is used in the furnace, some users of the process dispense with the protective atmosphere and use the normal air atmosphere instead, plus a generous supply of flux on the parts to assure wetting.

TABLE I—TYPICAL BRAZING METALS AND SUGGESTED FLUXES

Brazing Metal	Furnace Temperature Deg. F (Approx.)	Suggested Flux (if needed)
Copper (any commercial grade)	2000-2100	"Oxweld Brazo"
Brass (60 Cu 40 Zn)	1750-2000	Anhydrous Borax, or Cryolite
"50 per cent" silver-brazing alloy (50 Ag, 34 Cu, 16 Zn)	1550-1700	
"Sil-Fos" silver-brazing alloy (15 Ag, 80 Cu, 5P)	1400-1550	"Handy"
"Easy-Flo" silver-brazing alloy (50 Ag, 15.5 Cu, 16.5 Zn, 18 Cd)	1250-1400	

Avoiding Embrittlement of Copper Assemblies

When brazing assemblies made of copper, consideration should be given to the effect which the furnace atmosphere might have toward embrittling the copper. It may become necessary to make the assemblies from a different grade of copper, or to use a neutral or oxidizing furnace atmosphere. For instance, if the copper contains oxygen, it can be expected that an atmosphere of a reducing nature, even one containing as little hydrogen as 0.1 or 0.2 per cent by volume, will cause embrittlement at temperatures in excess of 750 F. This effect is the result of the formation of tiny steam pockets within the copper, from the combination of hydrogen with oxygen, which build up tremendous pressure and actually blow the copper apart. If the reducing gas contains carbon monoxide a similar effect takes place.

Any of the tough pitch coppers contain enough oxygen to cause embrittlement by hydrogen. Grades of copper usually not subject to embrittlement by hydrogen, are those deoxidized with such materials as silicon, boron, calcium, calcium boride, manganese, etc. Phosphorous is widely used in the copper industry as a deoxidizer, but there is no assurance that the deoxidation is always complete and the material may be subject to embrittlement.

Selecting a Flux if Needed

A WIDE variety of fluxes is available, but no attempt will be made to give a complete list here. With a few simple experiments one can easily determine the desirability of

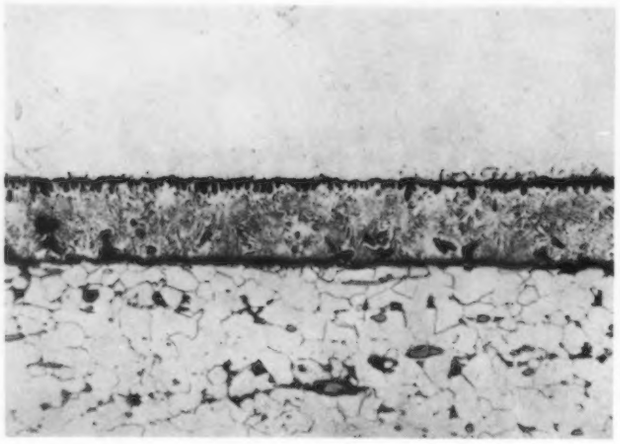


FIG. 67—Photomicrograph of a furnace brazed joint using Easy-Flo silver-brazing alloy and Handy flux at 1225 deg. F., bonding copper to steel. A slightly oxidizing atmosphere was used to avoid embrittlement of the copper.

any particular flux. If the brazing metal is copper or brass, typical materials used as fluxes are: anhydrous borax rather than crystal borax, anhydrous borax plus boric acid, or Cryolite (sodium aluminum fluoride).

These fluxes generally leave a deposit on the work after brazing. Borax or borax plus boric acid leaves a hard glassy deposit which adheres firmly to the metal and requires a stiff wire brushing or chipping for removal. Cryolite leaves a deposit which, with moisture from the air, forms a corrosive salt. The former are not so active as those containing fluorine but they do have the advantage that they can be left on the assemblies after brazing, if desired, because the residue is not chemically active. The deposit left by Cryolite can be removed by steam cleaning, a hot-water bath, or pickling.

Anhydrous borax can be obtained from chemical supply houses or producers, such as Merck & Co., Inc., Rahway, N. J., or Pacific Coast Borax Co., 51 Madison Avenue, New York. It is generally specified as "borax fused (borax glass; anhydrous sodium borate) ground." Cryolite is available from such concerns as F. I. DuPont de Nemours & Co., Inc., Wilmington, Del., and Charles Hardy, Inc., 415 Lexington Avenue, New York.

A prepared flux which is quite suitable for furnace brazing is sold by the Linde Air Products Co. under the trade name of Oxweld-Brazo flux. It can be purchased from this company or from welding supply houses.

When using silver-brazing alloys for which temperatures of 1700 deg F. and below are generally suitable, fluxes with lower melting points than those just named are sometimes used. One of these is "Handy" flux. It begins to fuse at 800 deg. F. and at 1100 deg. F. it is a thin active fluid. After brazing it can be removed by scrubbing in hot water, or by pickling.

Forms and Applications of Fluxes

The fluxes are generally obtained as powder or in the form of a paste, which usually require mixing with water, alcohol, or similar liquid in order to apply them. Flux solutions are sometimes used, in which case heating is desirable because hot solutions hold more flux than cold ones. Some operators believe that distilled water makes better solutions than tap water. Upon drying, the flux adheres in the form of a fragile powdery layer.

When brazing with low-melting alloys it is generally necessary to coat the brazing metal with the flux, also the surfaces of the parts within the joints before assembly. Otherwise a protective-oxide film or envelope is liable to form around the brazing metal or within the joints and keep the brazing metal from wetting. A convenient way to apply the flux to rings or slugs is to dip them into the flux solution. It is desirable to have clean surfaces within the joints, free from oil, oxides or dirt. If necessary, cleaning operations such as bright dipping, washing, or burnishing with emery cloth should be resorted to, previous to applying the flux and previous to assembling the parts.

Hollow Bodies Should Be Vented

HOLLOW receptacles, such as refrigerator floats and receivers, should be properly vented to get best results in the furnace-brazing process. The assemblies enter the furnace filled with air, the furnace is naturally hot, and when the assemblies strike the heat the air within them immediately starts to expand. The rate of expansion is so rapid that unless the assemblies are well vented or firmly locked together, such as by tack welding, the members are likely to be forced apart. In such event the assemblies probably would be spoiled, so suitable precautions are necessary to avoid this difficulty.

In addition to supplying a vent, consideration must be given to its proper location, to assure a good protective atmosphere within the assemblies as well as outside them. In other words, the air should be displaced from inside the assemblies by the gas in the furnace atmosphere.

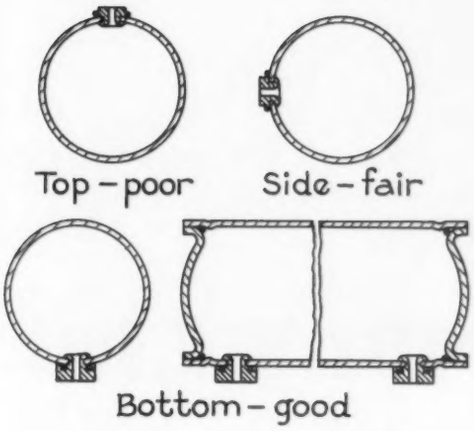
As the assemblies enter the hot protective atmosphere in which hydrogen generally plays an important part, the air within them combines with hydrogen at the vents to form water vapor inside the assemblies. Also, any oil or moisture inside forms additional vapors. The best results in purging the assemblies of these vapors are obtained when the vents are at the bottom. See Fig. 68.

If the vent is at the top, as shown in the upper left of Fig. 68, the heavy vapors likely will remain within the assembly and there is a good possibility that the inner surfaces of the assembly will become blued with oxides. The joints might even be poorly brazed, because the copper might not wet the surfaces properly. If the vent is on a side as indicated at the upper right, better results will be obtained, but even then, particularly where the diameter of the assembly is large, the heavy vapors might lie in the bottom and cause some trouble.

If the vent is at the bottom, however, as shown in the two lower views, the lighter gasses will enter and rise to the top of the assembly and force the heavy vapors out the bottom. Within a short time the entire assembly will be filled with good clean gas, the inner lining will be as clean and bright after brazing as are the outer surfaces, and well-brazed joints are assured.

The refrigerator float shown in Fig. 59 [THE IRON AGE of Nov. 24, page 31] has a small vent hole at the bottom which is plugged after furnace brazing by means of a brass escutcheon pin which is soft soldered in place. Also, the two halves of the float are tack-welded around the seam at three points during assembly, to prevent them from blowing apart when the float enters the heating chamber.

When a tenon is pressed into a dead-end hole, as illustrated in Fig. 69,



AT LEFT

FIG. 68—Vents in the bottom of assemblies permit light furnace gases to purge out air and heavy vapors, giving clean inner surfaces and assurance of tight joints. Vents at top or sides are less desirable.

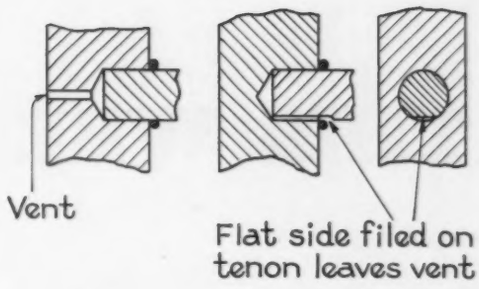


FIG. 69—Tenons pressed into drilled holes leave air pockets which might need to be vented to avoid having members blow apart while being furnace brazed. Two venting schemes are here shown.

the hollow space at the end of the tenon sometimes must be vented. At the left, a small vent hole is shown drilled through the body member, to permit the escape of air and any oil or water vapors which might be present. The two views at the right show another scheme, sometimes effectively used, which simply consists of flattening one side of the tenon with a file in order to provide a suitable vent. Notching of the tenon will give the same results. If such products as these are not vented, the assemblies are sometimes blown apart by the pressure built up in the pockets, the probability of this happening being dependent upon the volume of air space, the amount of foreign material in the hole, and the tightness of the fit. If the fit is loose, the assembly will sometimes vent itself, but, in general when brazing ferrous metals with copper, it is desirable to have a snug fit to get best results with respect to strength and tightness of joints.

(TO BE CONTINUED)

Cutting Costs of Cutting Oils

SOLUBLE cutting oils or so-called coolants used for such cutting operations as turning, milling, boring, drilling, broaching, etc., are usually made by the oil companies by blending a napthenic-sulphonic acid soap (a by-product of white oil refining) with oil and a coupling agent. The usual formula is about 15 parts of base to 85 parts of oil. The emulsions made with these soluble oils at point of use, especially the cheaper grades most generally specified, are notoriously unstable and require the most efficient means of dispersing the soluble oil into the water and of maintaining uniformity of the coolant at the machine.

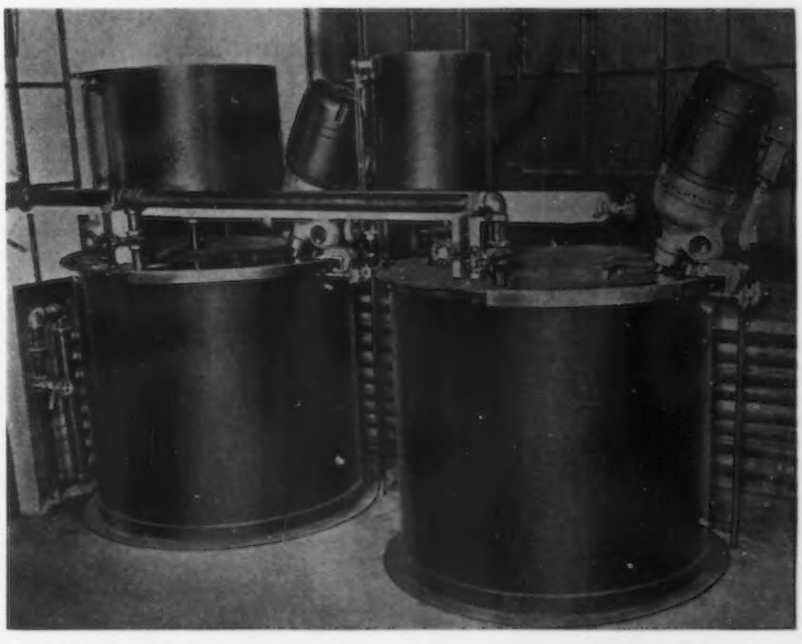
Many users, including some of the large automotive manufacturers, have found the "Lightnin" mixers made by the Mixing Equipment Co. of Rochester, N. Y., particularly well adapted for this work. The initial cost and the power requirements are considerably lower than for slower paddle type agitators. Greater uniformity of dispersion, speeded up production, reduced spoilage due to improper lubrication and increased tool life are also claimed for this equipment by the builder.

A typical installation is that of one of the largest builders of better cars. The two mixers used are Lightnin models M-1, with monel metal shafts and propellers, and explosion-proof motors. Shafts are 72 in. long. Tanks are 48 in. in diameter, 78 in. deep and hold 600 gal. They extend through the working mezzanine floor to the floor below, where the pumps are located.

These tanks are installed in a separate small building and the coolant is pumped in a closed circuit through all of the manufacturing buildings where metal cutting is done. Although for actual work performed the usual semi-enclosed motor is all that is required for the mixer, explosion-proof motors were specified due to the fact that some inflammable liquids are stored in the same building where the mixing operations are carried out.

The operation is as follows: The tank is filled about one-half full of

(CONCLUDED ON PAGE 82)



PORTABLE motorized "Lightnin" mixing units are being applied in the preparation of soluble oil emulsions for metal cutting coolants.

THIS WEEK ON THE ASSEMBLY LINE

° ° °

By W. F. SHERMAN
Detroit Editor

° ° °

. . . Strikes hinder auto plants' efforts to fill orders . . . November registrations up 54 per cent, nearing 1937 levels . . . Steel price announcement counted on to increase orders.

DETROIT.—Although hindered by strikes, the automobile industry managed to get out almost 100,000 cars last week. Output reached a new high for the year—98,695 units—and continued to widen the gap over a year ago, when the total was 86,173 cars. Last week's total was a substantial rise over that of the previous week—84,930 cars. Ward's Automotive Reports estimates November production at 372,000, a gain of about 72 per cent over October compared with a 10 per cent rise in November, 1937, over October.

An unauthorized strike at Plymouth last Wednesday cut out most of a day's output. Otherwise the total for the week would easily have exceeded the 100,000 mark. As last week closed, a strike at the Fisher No. 1 plant at Flint threatened to halt Buick in its stride. If December output is below 400,000, the strikers must take the blame.

Last week's gains are attributable to increases by almost all producers, with Ford's upward revision in production schedules contributing substantially. Heading toward an announced goal of 4400 a day—including the Lincoln and Lincoln-Zephyr with Mercury and Ford V-8 output—Ford totaled 17,850 units during the week, slightly under a 3600 daily average. In the course of the next week or 10 days, Ford should reach the announced goal of 4400 a day. Incidentally, Lincoln-Zephyr's projected schedules have been increased for the third time since 1939 models were introduced six or seven weeks ago. Factory output now is about 116 per cent ahead of original schedules, according to a factory spokesman.

Chevrolet stuck close to its normal of 26,000 for the week, while General Motors as a whole continued to be the leading producer, turning out 44,505 units against 40,799 the previous week. Chrysler divisions pushed upward to 25,270 from 20,600, with Plymouth assembling 12,170 cars.

Car Registrations Gain

Lending strength to the optimism of the automobile companies, official registration figures show that the upward trend of new passenger car registrations, begun in October, is gathering force. Preliminary tabulations, based on reports from metropolitan centers during the first 21 days of November, show registrations 54.03 per cent greater than corresponding figures for October, according to R. L. Polk & Co. Last November's registration mark of 196,469 may be reached again this year. Latest comparative figures indicate a marked difference from earlier monthly reports which showed 1938 registrations lagging 40 or 50 per cent under 1937 figures.

Sectional automobile registration figures are a barometer which indicate with some accuracy the condition of business on a sectional basis. The West South Central states, including Arkansas, Louisiana, Oklahoma and Texas, show the greatest indicated increase, 72.15 per cent; the East South Central states (Alabama, Kentucky, Mississippi and Tennessee) are up 69.53 per cent; the East North Central states (Illinois, Indiana, Michigan and Wisconsin) are up 62.42 per cent; South Atlantic states (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia and West Virginia) are up 61.53 per cent; New England, 56.20 per cent; Middle Atlantic, 54.27; Mountain, 50 per cent; Pacific, 47.08, and West North Central, 26.88.

Buick Affected by Strike

The threat to stop all Buick production came at Flint last Friday when UAW members called a strike at the main Fisher Body plant which supplies Buick, throwing 6400 out of work and forcing the shut down of Buick's final assembly line where 3000 are employed. Another 11,000 employees at Buick were faced with the possibility of a layoff if stock supplies reached a maximum before settlement of the strike. Union officials declared that members of the Fisher local had voted 3434 to 433 to walk out as a result of the failure of negotiators to settle a long dispute of demands in two departments for day wages instead of piece work. The union officials asserted that their strike was authorized several weeks ago by the UAW International Executive Board. They also insist that the regular grievance procedure had been followed and no satisfactory answer reached.

Violation of the union agreement was charged immediately by General Motors Corp., which said through a spokesman, "The international officers, in a meeting in Detroit Wednesday, were invited to bring the issue to

HUMAN FINGERS MECHANICAL HANDS

It takes a happy combination of both to fabricate

Barnes-made Springs

Skilled hands are matched by machines equally facile in their adaptability to the amazing twists and turns in spring manufacture. Just what this means to you as a user of springs may best be expressed in terms of:

QUALITY

PRICE

DELIVERY

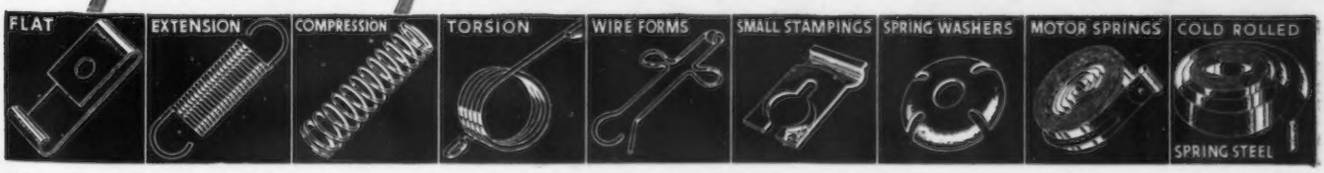
All three considered, you'll find that Barnes-made Springs are the economical buy.

Springs

THE WALLACE BARNES CO.

DIVISION OF ASSOCIATED SPRING CORPORATION

BRISTOL • CONNECTICUT



SPRINGMAKERS FOR MORE THAN THREE QUARTERS OF A CENTURY

Detroit for discussion in accordance with the grievance procedure in case no satisfactory settlement was reached in Flint Thursday. Evidently the local in Flint chose direct action without resorting to the grievance procedure, throwing 6400 men out of work."

Regarding the piecework situation, GM's attitude was expressed in a statement which charged that slowdowns were resorted to by UAW men who were on a day-work basis. "Due to the problem of slowdowns which exists in the day-work part of the shop, the local management has hesitated to grant the demand (for the elimination of piecework) without adequate protection against slowdowns."

On Monday Fisher Body plant No. 1 at Flint remained closed pending a vote of the Flint local UAW on a strike settlement reached at midnight. Buick's final assembly line was shut down at 8 a. m. owing to a shortage of bodies. The rest of the plant was shut down at 10 a. m. The only point involved in the agreement was to end the strike and go back to work. The piecework issue was left to negotiation at a future date.

Summary action against four men adjudged chiefly responsible for the Plymouth strike last Wednesday was taken as the result of a union request that the four be disciplined. UAW officials asked Plymouth officials to lay off the men for two weeks. Thursday morning, the 14,600 men in Plymouth and other plants who were made idle as a result of the strike, went back to their jobs. Leo Lamotte, president of the Plymouth local of the UAW, and a member of the UAW International Executive Board and regional director of UAW activities in Chrysler plants, directed the investigation and disciplinary action. He denounced the strike as unauthorized and unjustified.

The second UAW-GM case to go before an umpire is the dispute which halted production at the Chevrolet gear and axle plant a week ago Friday. Prof. I. L. Sharfman, chairman of the Department of Economics at the University of Michigan, agreed to act as umpire and arbitrator, passing on the status of seven men laid off at the plant after the strike.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

SAY, THEY'VE WENT AN' MADE TH' PRESIDENT OF OUR LOCAL A FOREMAN-- IT'S JUST POSTED ON TH' BULLETIN BOARD -- THAT LETS HIM OUT AS OUR LOCAL PRESIDENT
I KNEW THAT WAS COMIN! HE WAS GITTIN' TOO GOOD A PRESIDENT FOR US, SO THEY MADE HIM A FOREMAN FOR THEM!
TH' ONLY WAY WE CAN KEEP ONE IS TO ELECT ONE WHO IS NO GOOD TO US -- AND IF HE'S NO GOOD TO US, HE'S A LOT OF 'GOOD TO THEM!
AN' YOU CAN'T FOOL 'EM, EITHER-- WE ELECTED A GUY ONCE WHO MADE A GREAT PRESIDENT FOR US, BUT TH' WORST MACHINIST IN TH' SHOP -- THEY MADE HIM A FOREMAN!
TOOL RO
T. M. REG. U. S. PAT. OFF.
STOLEN TALENT
COPR. 1938 BY NEA SERVICE, INC.
J.R.WILLIAMS 12-2

Steel Buying Expected

An aftermath of the Chrysler development of the Superfinish process was seen last week when Chrysler Corp. announced that there now are three licensees building, or preparing to build, equipment for this type of finish. For approximately six months the Foster Machine Co. of Elkhart, Ind., has been a licensee. To provide ample capacity to meet the demand for equipment of this kind, Chrysler has licensed Cincinnati Milling Machine Co., of Cincinnati, and the Norton Co., of Worcester, Mass. Observation confirms the fact that automotive interest is on the increase, with most of the other auto manufacturers comparing results of this process with other finishes which they have developed in their own shops and laboratories.

One of the effects of recent improvements in surface finish is aptly illustrated by the experience of a refrigeration concern which has successfully extended its guarantee period from two years to five years as a result of using a fine honing process. Further refinements in finish and its application to every wearing part is counted on to enable this firm soon to offer a flat 10-year guarantee of its product.

Packard, which 35 years ago at this time was just completing construction of its first plant in Detroit, has been granted permission by the Common Council of the City of Detroit to construct a bridge across East Grand Boulevard, at Concord Avenue, to connect its two plant buildings, between which there is a heavy flow of parts in process.

As a result of Hupmobile Motor Car Corp.'s decision to sell part of its manufacturing space to raise capital, the area of the Detroit plant of the Midland Steel Products Co. is being increased by more than 31 per cent. Midland has purchased part of the Hupp buildings.

Chrysler's New Driving Mechanism Announced

The Chrysler Corp. on Monday demonstrated in Detroit a hydraulic driving mechanism on Chrysler Imperial models which does away with the necessity for gear shifting in traffic and permits smoother speed changing.

The new mechanism, which replaces the conventional flywheel, consists of a stamped, drum-like case with

two opposing sets of rotor blades, or vanes, operating immersed in very light oil. Oil thrown from the driving disk vanes to the driven disk vanes, or fins, transmits the engine power to the rear wheels. A conventional transmission is supplied to provide reverse gear and low speed forward gears for special occasions such as super-acceleration, starting in mud or operating in over-drive, and a conventional clutch is provided to make these gear shifts possible when they are necessary.

This fluid flywheel, as Chrysler calls it, is similar to turbine drives which have been used in the past and also is similar to the driving mechanism used on the English Daimler car. The principal difficulty overcome in its development was that cast iron cases suffered oil loss because centrifugal force caused seepage through the casting. A steel stamping provides necessary strength and prevents oil loss. In addition, leakage between parts of the case at their joint is prevented by a seal similar to an ice machine (refrigerant) seal. Vanes inside the case are light stampings, riveted to the case. This driving mechanism is said to provide all the flexibility of either steam or electricity in smoothness of speed changing. If stopped in high gear with engine idling, the fluid drive transmits enough power to creep the car slowly forward, a tendency which is counteracted by setting the brake.

For the present Chrysler intends to restrict use of this driving unit to higher priced cars.

Steel Wire Spring Company Expands

CLEVELAND. — United States Steel Wire Spring Co., Cleveland, has leased new quarters which will afford double its former space. Improvements totaling about $8,000 will be made. The company makes steel wire springs, and has large automotive trade.

Before and After the Magnaflux Test for Flaws in Steering Knuckle Forgings

o o o

PONTIAC has installed Magnaflux equipment to detect forging flaws in its 1939 production of these parts. It is believed that this is the first instance in industry where this magnetic method is being used for the 100 per cent inspection of any part in production. The forging is placed in the fixture where a high flow of current magnetizes it. The part is then placed in a dip tank where the iron powder is mixed with kerosene or thin oil. Where forging cracks are expected lengthwise or longitudinally in the steering knuckle, the magnetizing is done circularly so the flux runs cross-wise the direction of any flaws. Forgings to which no powder is attracted magnetically are demagnetized before going through further machining operations.

THIS WEEK IN WASHINGTON

. . . Industrialists differ over incentive taxes to encourage profit-sharing . . . Isador Lubin says wages in lower brackets must be lifted as Monopoly hearings open . . . PWA claims share of credit for steel revival.

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON. — Continued business fear of what the Government might do to it has resulted in lagging enterprise, President Lammot du Pont, of E. I. du Pont de Nemours & Co., told the Senate Finance sub-committee on profit sharing last week as he testified in opposition to incentive taxation to encourage industrial profit sharing.

He said he was afraid "there would be danger of too much Administrative 'interpretation' of such tax laws and of consequent bureaucratic interference with the conduct of business enterprise."

Also opposed to incentive taxation to encourage profit sharing but for a different reason, John L. Lewis, chairman of the Congress of Industrial Organizations, said he felt it would upset the basis of competition by giving preferred status to some employers. In contrast with the opposition of Mr. du Pont and Mr. Lewis, President Gerard Swope of the General Electric Co., had previously declared that the Government must adopt some form of incentive taxation in order to induce industry to stabilize employment through an annual wage.

Among others who indorsed the principles of profit sharing and incentive taxation were Frank Gannett, Rochester, N. Y., publisher of the Gannett newspapers; A. L. Marsh, Detroit industrialist, and Prof. Willford I. King, of New York University.

Greater Uncertainty Seen

Mr. du Pont said that "once the principle is established, it can readily be used for ends definitely harmful to business, thus creating even greater uncertainty." Instead of profit sharing systems, Mr. du Pont urged "high wages based on efficient performance," and with respect to the former again found himself in agreement with Mr. Lewis, who sneered at profit sharing as a delusion and a form of largess undesired by the worker who "does not want to be the recipient of this paternalistic generosity."

Mr. Lewis was more bitter in his opposition to profit sharing than was President Green of the American Federation of Labor. Mr. Lewis hit hard at the principle itself and said workers prefer to be paid each week on a fair wage basis. Mr. Green favored the principle of state incentive taxation provided labor is permitted to bargain collectively in setting up profit sharing systems but opposed use of the taxing power of the Federal Government to promote profit sharing.

Law Simplification Urged

Mr. du Pont declared that the best incentive for business would be a simplification of tax laws, reasonable freedom from frequent changes in such laws, and "the lowest possible tax rate based on economically administered Government activities." Expressing the view that taxation should be for revenue only, Mr. du Pont said "there should be a tax system both for individuals and corporations which does not penalize success through progressively higher rates as the income increases, but which recognizes that under our competitive system profits are unusually large only where risks have been great, and management is sound and progressive."

During 1937, his company paid out approximately $20,131,000 of $50,000,000 in net profits, Mr. du Pont said, in benefits for employees, $7,593,000 representing cash payments for meritorious work.

Best Profit-Sharer

"As one who is critical of profit sharing you are one of the best profit sharers I ever saw," remarked Senator Vandenberg, Republican of Michigan.

Mr. Swope said that General Electric in 22 years had paid out approximately $100,000,000 in shared profits to 60,000 employees, after saying he "hoped" profit sharing with employees was good business, but adding, "I don't know it." General Electric, he said, had abandoned a profit-sharing plan established in 1916 because the plan was not geared to company profits. This plan paid employees with five years' service an additional 5 per cent of their annual earnings. A plan by which employees are given 12½ per cent of the net profits was established in 1934 and under it, Mr. Swope said, $5,700,000 was paid out in 1937, approximately $600,000 in 1936, and nothing in 1935. In 1938, Mr. Swope testified, little will be paid out.

"Not yet," replied Mr. Swope, as he sharply rapped a wooden desk and the audience laughed, when asked by Senator Herring whether General Electric had experienced any strikes or other labor trouble.

Mr. Lewis said there is no security for workers in any plans evolved by management because labor is not given a voice in management.

"I know that from time to time well-meaning men in industry have

The Skilled Craftsman

prefers

SUNOCO

EMULSIFYING

CUTTING OIL

SUN OIL COMPANY - PHILADELPHIA, PA.

voluntarily wanted to give workers some participation in their profits, but I don't think that out of those experiments has there come any crystallized philosophy or basic principles that could be applied today," said Mr. Lewis. "Frankly, I think the profit-sharing idea is rather a delusion and a snare in modern industry."

Declaring he knew of no profit-sharing plans that have been adopted since collective bargaining was enacted into law, Mr. Lewis contended that if employees really desire to share profits they would have no difficulty reaching an agreement. The competitive relationship between industries, he said, might be upset if there were incentive taxation to encourage profit sharing.

"Labor's disillusioned experience with regard to profit-sharing plans have been that they have been used as a device to avoid the payment of an immediate decent wage and have made labor dependent upon haphazard industrial and financial policies of management," Mr. Lewis declared. "Immediate higher standards of living achieved through collective bargaining with labor unions is the best guarantee policy for the continued expansion of industrial activity and profits for management."

When Chairman Herring asked Mr. Lewis if he believed "the Government is the only one in a position to provide security for the workers," Mr. Lewis replied that he could not see how anyone else can do it.

FOR BUSES .. BY PARISH

The modern motor bus has "lines", and Parish created some of them. Take this wheel housing for example. A good stamping job involving a smooth 3" draw in steel .078" thick. The outside curve is 25 3/4" radius.

Parish knows metals and how to form them. This, plus adequate press equipment, enables us to undertake and successfully carry to completion any difficult pressed metal job you can put up to us.

This service is for *you*. Won't you avail yourself of it?

PARISH PRESSED STEEL CO.
Reading, Pa.

PACIFIC COAST REPRESENTATIVE
F. Somers Peterson Co., 57 California St., San Francisco, Cal.

PARISH *Specialists in Stampings of Distinction*

War Department Special Awards

WASHINGTON.—The War Department has announced awards totaling $1,030,868 under its ordnance procurement program for special machinery, guns and ammunition. The contracts awarded follow:

For the 3 in. anti-aircraft program—Timken-Detroit Axle Co., $28,290 for machining axles, finishing and assembling axle assemblies; Lowell Wrench Co., Worcester, Mass., $2245 for ratchet wrenches; McGill Mfg. Co., Washington, $2036 for ball bearings; and SKF Industries, Inc., Philadelphia, $613 for ball bearings.

For the special machinery program—Davenport Machine Tool Co., Inc., Rochester, N. Y., $8165 for caliber .50 primer manufacturing machine; E. I. du Pont de Nemours & Co., Wilmington, Del., $12,200 for mercury fulminate charging machines; McKiernan-Terry Corp., Dover, N. J., $8790 for TNT melting and mixing kettles; Cincinnati Milling Machines & Cincinnati Grinders, Inc., Cincinnati, $75,438 for machines for manufacturing operating rod, caliber .30 rifle, M1, and $4043 for universal tool and cutter grinders; Potter & Johnson, Pawtucket, R. I., $3000 for hand milling machines; Gallmeyer & Livingston Co., Grand Rapids, Mich., $4730 for surface grinders; the LaPointe Machine Tool Co., Hudson, Mass., $4008 for horizontal broaching machine; Bryant Machinery & Engineering Co., Chicago, $5750 for vertical drill presses; Barber-Colman Co., Rockford, Ill., $2850 for hob, reamer and cutter grinder; Brown & Sharpe Mfg. Co., Providence, R. I., $5084 for light, vertical spindle milling machine, $22,799 for universal grinding machines; $4435 for universal cylindrical grinder; $4443 for universal milling machine; Henry Prentiss & Co., Inc., New York, $2146 for small internal grinder; Onsrud Machine Works, Inc., Chicago, $88,415 for woodworking machines; Jones & Lamson Machine Co., Springfield, Vt., $4434 for comparator and measuring projectors; M. F. Allen & Co., Inc., New York, $1390 for motor drives for lathes; Vandyck-Churchill Co., New York, $4,639 for universal milling machine.

For the ammunition program—Scovill Mfg. Co., Bridgeport, Conn., $165,400 for cartridge cases, 75 mm.

For the artillery program—Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., $558,525 for anti-aircraft automatic guns; Wisconsin Axle Division of Timken-Detroit Axle Co., Oshkosh, Wis., $6996 for power transmitting units for pilot tank.

For the Engineering Corps—Bausch & Lomb Optical Co., Rochester, N. Y., $102,199 for stereoscopic plotting equipment for aerial mapping; Sperry Gyroscope Co., Inc., Brooklyn, N. Y., $1,782,963 for 60-in. anti-aircraft searchlights.

Raises Needed for Poorly Paid, Lubin Tells Monopoly Hearing

WASHINGTON.—The Temporary National Economic (anti-monopoly) Committee launched its long-heralded public hearings last week and heard as the first witness Isador Lubin, committee member and Commissioner of Labor Statistics, who told industry that it no longer can depend upon population increases to sustain a high rate of production, but must look to increases in the incomes of persons in the lower brackets.

Without mentioning the term monopoly or referring to the committee's ultimate objectives, Dr. Lubin, fortified with a formidable array of charts and tables, laid before the committee much of the fundamentals on which it will build up its case in coming months.

Citing population, industrial production, national income, income lost in the depression, and other figures, Lubin forecast that the demands made upon industry, if only a moderate increase in the incomes of all families and individuals now receiving less than $2,500 materialized, would be "almost unbelievable." Surplus capacity, he said, would disappear in the vast majority of our industries and in many of them present capacity would run far short of the demands of our population.

Durable Goods Hardest Hit

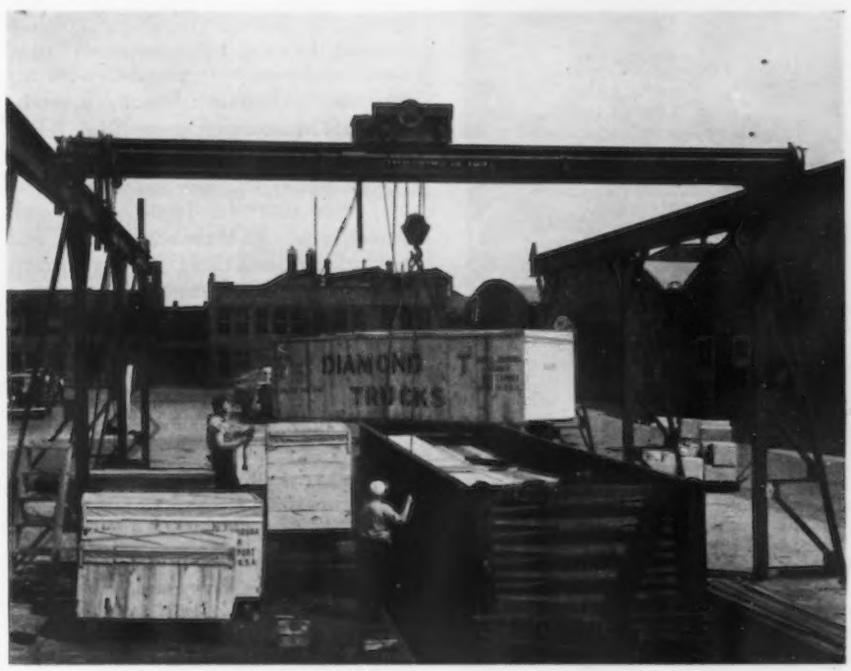
He contended that only through such an increase in income can the durable goods industries be kept moving at a good pace, explaining that the depression was primarily characterized by a lag in durable goods while nondurable goods maintained a fair degree of constancy. He showed that industrial production tripled between 1899 and 1929 and then lost all of its gains, slipping back 30 years to a figure slightly above the 1899 production rate. Lubin cited pig iron, cement, automobiles, housing, coal and lumber among other commodities which suffered sharp set-backs during this period.

The session got off on a brisk start after the customary Washington picture-taking preliminaries. The size of the crowd would put the hearing in the ranks of a major attraction, but when Dr. Lubin, who is generally credited with having done an excellent job as head of the Bureau of Labor Statistics, displayed his charts and settled down to depict a broad picture of the national economy, interest waned, spectators dozed off and a few just slouched in their seats.

No Witch Burning—Yet

Certainly, the first session was far from being any witch burning fiesta, but many agreed that the initial steps gave no assurance as to what might come at some later date. Senator O'Mahoney, committee chairman, from the outset reiterated his statement that nothing but an unbiased, impartial and constructive procedure was contemplated by the committee.

"The members of the committee," the chairman said, "are deeply sensible of the responsibility that rests upon them to utilize the broad powers with which they have been invested solely for the public good. No personal, partisan, or factional program is con-



CUT LOADING TIME 87%

Before installing the crane it took four men six hours to load these boxed trucks on a car. Now with this one-motor 5-ton crane two men do the job in only 1½ hours and with much greater safety.

Whiting electric and handpower traveling cranes are the answer to many industrial handling problems. Let us figure on your next handling job.

WHITING CORPORATION
15601 Lathrop Avenue, Harvey, Illinois

WHITING
PIONEERS SINCE 1884

SPRINGS
STAMPINGS
WIRE FORMS

Let our experience and modern facilities assist you. Send in your sketches or samples for quotations.

IT WILL PAY YOU TO INQUIRE

Ask for our stock lists on Washers, Cotters, and Expansion Plugs.

M·D·H Hubbard Spring Company

M. D. HUBBARD, Pres. F. M. HUBBARD J. A. HUBBARD, Sec'y

1905 1938

750 Central Ave., Pontiac, Mich.

trolling here. The processes of the committee will not be used for any purpose save to develop economic facts which in the very nature of things must be widely comprehended before any constructive recommendations may be outlined."

All Members There

All 12 members of the committee were on hand the first day, from the Justice Department's Thurman Arnold to the Assistant Secretary of Commerce, Richard C. Patterson. Senator King, Democrat, of Utah, who frequently has been described as out of sympathy with the committee's work and skeptical that the undertaking was a build-up for the Borah-O'Mahoney Federal licensing bill, questioned Lubin occasionally as he proceeded with his testimony. Senator Borah, Republican, of Idaho, sitting next to King, did likewise, once referring to cement prices which he said were prevented by "price controls" from falling with production. O'Mahoney would add a word here and there, usually in confirmation of what Lubin was saying.

Dr. Willard L. Thorp, Commerce Department representative on the committee, and chief economist for Dun & Bradstreet, New York, attempted to draw a picture of the concentration of industry and cited as an example 22 industries which he said a few large companies control and dominate. In the steel industry, he said there were three companies doing 60.5 per cent of the business; iron ore, four companies, 64 per cent; automobiles, three companies, 83 per cent; copper, four companies, 78 per cent.

He characterized "monopoly" as rare, explaining that the common form of concentration, as illustrated by his figures, was where two, three, four or more corporations dominated a particular field. Mere bigness of a corporation did not necessarily imply concentration or even monopoly, Dr. Thorp told the committee, pointing to large corporations with highly decentralized plants and large concerns which cover only a small part of a given industry.

Illustrates Castings Output

Flanked by charts to which he referred constantly throughout his testimony. Dr. Thorp exhibited a widely divergent set of curves showing the production of steel castings by nine plants, whose identities were not revealed. Another chart indicated production by the entire industry, showing a 30 per cent gain while one particular plant increased its production two and one-half times between 1927 and 1929. While declines were recorded for all plants between 1929 and 1932, the charts showed that the plants which enjoyed the greatest increases between 1927 and 1929 recovered much more rapidly than the industry as a whole.

Observers had difficulty in attaching much significance to the gist of the testimony by the early witnesses, there being nothing new about any of the facts brought out. They have been cited again and again by many both within and without the Government and to that extent their presentation was considered by many observers to constitute a period of training for committee members, to give them a factual background and to put them in the mood for facts to be developed at a later date.

Arnold Objects

Animosities within the committee's membership, calculated from the beginning to come into the open sooner or later, were demonstrated at the early sessions to a limited degree. Thurman Arnold, the Justice Department's energetic head of the anti-trust division, took exception to Thorp's testimony that the Sherman anti-trust law is in part responsible for the growth of large corporations. To Thorp's explanation that five enterprises, for example, could and had merged into a single one to overcome any problem of conspiracy or combination, Arnold said:

"I don't think that is the position which the anti-trust division is taking and I don't think it is one that they are in a position to take." He added that Thorp's view that the Sherman anti-trust law actually encourages combinations was "a common interpretation, newspaper interpretation of the anti-trust law."

Dr. Thorp replied that he was merely citing the problem in terms of business motivation and "I'm afraid business isn't always motivated in a perfect understanding of the meaning of the laws."

"I would question that statement very seriously," Arnold answered.

Leon Henderson, executive secretary of the committee and former director of the NRA Research & Planning Division, outlined the scope of the main lines of study to be followed by the committee and by governmental units cooperating with the committee. Among others, was the proposal to establish a Bureau of Industrial Economics which, according to reports, Mr. Henderson would like to head. The other lines of study listed by the committee secretary were:

1. Concentration and control and all its ramifications;
2. Price system and price policies

GEOMETRIC

For

BETTER THREADING

Smooth, accurate threads at the lowest possible cost—isn't that what you want when you buy threading tools? Geometric features are rigid chaser support, fine accurate adjustments, and positive, dependable opening and closing action on our automatic tools. Geometric tools are compact, simple in design. They are built by precision methods from the finest steels, hardened and ground throughout, and carefully tested and inspected. You can count on them for lower threading costs and better screw threads, for greater operating convenience and freedom from trouble. Geometric makes self-opening die heads, collapsing taps, solid adjustable die heads and taps, grinding fixtures and threading machines—the most complete line of threading tools on the market.

Let us tell you more—send for our catalog

GEOMETRIC

TOOL COMPANY

NEW HAVEN, CONNECTICUT

including patterns and standards of desirability in rigid and flexible prices;

3. Effect of governmental policies such as taxation, patents, attempts to adjust purchasing power to 1926 levels; other governmental policies not specifically covered in the resolution creating the monopoly committee;

4. Socially and economically harmful competition;

5. Improvement of anti-trust policy and procedure, codification of the laws as to restraints of trade, procedural study of investigations, enforcement and adjudicative processes, studies of foreign experience;

6. National standards for corporations;

7. Mergers, interlocking relationships, industrial, utility and bank holding companies, investment trusts;

8. Insurance companies—organization, practice, importance in economy, investment policies;

9. Corporate practices. Existing forms of business organization, trade associations, alternative forms;

10. Distribution. Marketing laws;

11. Credit mechanisms for small enterprises; and

12. Overall economic data and special studies. Consumer credit; labor racketeering; break-even points; depreciation and cost accounting; debt growth.

Soft Coal Freight Rates Extended

WASHINGTON.—Indefinite extension of present freight rates on bituminous coal beyond Dec. 31, approved by the Interstate Commerce Commission in a decision last Thursday, will, according to railroad authorities, mean an annual revenue of $19,374,421 which would have been wiped out had the commission permitted the rates to expire, as it was proposed in a general rate increase decision in October, 1937. A large portion of the revenue comes from hauling coal for the steel industry. Increases on the vast bulk of coal for the industry ranged from 3c. to 10c. per net ton.

Barium & Chemicals, Inc., Willoughby, Ohio, has succeeded the J. H. R. Products Co., which for the last 20 years has manufactured barium compounds and other products. Dr. M. J. Rentschler, research director of the latter company, will continue in that capacity with Barium & Chemicals, which has plants occupying 4½ acres for manufacture of all standard barium compounds.

HERE IS YOUR SAMPLE KIT OF

AMERICAN PLUS SCREWS with the PHILLIPS recessed head

$1.00

INCLUDING DRIVER

Try out industry's new fastening device — yourself. See how the screw with the patented recess clings to the driver — making it possible to drive with one hand — no pilot hole needed. See why the driver is self-centering — why it's impossible to drive screws crooked. Feel how easy it is to drive — because there's triple the contact with the driver and no danger of the driver slipping.

For $1.00 you can learn why hundreds of plants — from some of the big auto manufacturers down — are changing over to American PLUS Screws. Workers prefer them. They make faster driving methods safe to use. Purchasing men say they reduce assembly costs up to 50%!

Mail the coupon below now. The American PLUS Screw Sample Kit will be sent postpaid.

AMERICAN PLUS SCREWS

with the patented PHILLIPS recessed head

GAIN TIME GUIDE DRIVER GUARD WORK

Copyright 1938 by
AMERICAN SCREW COMPANY
Providence, R. I.

Chicago office and warehouse: 219 W. Randolph St.
Detroit office: 1010 Stephenson Building
Pacific Coast representative: Osgood & Howell, Los Angeles, Seattle, San Francisco
Reading Screw Company, Norristown, Pa. (division of American Screw Co.)

U. S. Patents on Products and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,336.
Other Domestic and Foreign Patents Allowed and Pending

SLOTTED HEAD AND PHILLIPS RECESSED HEAD WOOD SCREWS MACHINE SCREWS SHEET METAL SCREWS STOVE BOLTS

and a complete line of allied fastening devices

AMERICAN SCREW COMPANY
Providence, R. I.

Please send sample kit of American PLUS Screws. Enclosed is $1.00.

Name.....

Company.....

Address.....

Distributor.....

Stettinius Backs Social Security Act

WASHINGTON. — Warm approval of the Social Security Act by Chairman Edward R. Stettinius of the United States Steel Corp., in an address last Thursday at New York before the Association of Life Insurance Presidents, has directed increased attention to prospective broadening of the act at the forthcoming session of Congress.

Mr. Stettinius, who said the act is a great advance and that industry as well as Government must contribute increasingly to the general welfare, is a member of the Social Security Council and as such his voice is given weight as reflecting the legislative trend.

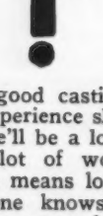
The council, established to protect the interests of labor, industry and the public, is preparing a report to be made to the Senate Finance Committee and the Social Security Board, and has announced "substantial agreement" on a proposal that the national Government assume one-third of the cost of the Federal old-age insurance program. The council has held a number of meetings in Washington.

The council plan calls for distributing the financial burden about equally among employers, employees, and United States Treasury, the latter to derive its portion from general taxation. No Council action will be taken on payroll taxes and the old-age reserve fund, both of which would be affected by old-age tax plan, until the Council has completed a three-year evaluation of the effects of the reserve on the national economy.

JUST TWO PILES OF SAND

But What a Difference!

NO one knows just what is going to happen when this pile of sand is used for making castings. Previous jobs have filled it full of iron—it's full of shot iron if it has been screened — worse if it hasn't. A lucky break and it may make a

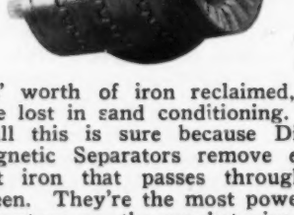


good mold, good castings may result. But experience shows that by all odds there'll be a lot of castings rejected, a lot of work gone to waste. That means lost profits.

And no one knows how many hours will be wasted in grinding surfaces on castings made rough by iron in this sand, nor how many dollars' worth of metal will be thrown away with refuse sand, nor how much time will be lost in reconditioning the sand. But, experience proves that losses will be heavy.

A foundry just can't do good work, can't make reasonable profits with this pile of sand.

THIS pile of sand is entirely free from iron. All the metal has been removed by a Dings High Intensity Magnetic Separator. No question about results. Castings good, surfaces smooth, no blowholes due to iron, a good many dollars' worth of iron reclaimed, no time lost in sand conditioning.



All this is sure because Dings Magnetic Separators remove even shot iron that passes through a screen. They're the most powerful separators on the market size for size! Bronze coil covers and spacer bands don't short-circuit the lines of force. More radiating surface assures cooler operation. Dings has been designing and building better magnetic equipment for over 40 years!

A foundry can do good work, make money with this pile of sand run over a Dings Magnetic Separator.

Send for complete details.

DINGS
MAGNETIC SEPARATOR CO.
727 Smith St., Milwaukee, Wis.

Dings High Intensity MAGNETIC SEPARATION

Government Order Week Ended Nov. 26

WASHINGTON. — Government purchases during the week ended Nov. 26 totaled $342,953.92 for iron and steel products; $544,472.91 for machinery; and $228,261.99 for transportation equipment. The awards for these, and related groups, follow:

IRON, STEEL PRODUCTS:

Pennsylvania Forge Corp., Philadelphia, forgings	$10,061.45
Judson Pacific Co., San Francisco, structural steel	28,158.00
General Steel Castings Corp., Eddystone, Pa., steel spuds	14,910.00
Bethlehem Steel Co., Bethlehem, Pa., steel sheet piling	99,247.44
Blaw-Knox Co., Pittsburgh, radio towers	33,072.00
Carnegie-Illinois Steel Corp., Denver, angles	10,081.84
Heltzel Steel Form & Iron Co., Warren, Ohio, curb and gutter forms	13,913.00
Howard Foundry Co., Chicago, assemblies, protecting cap	133,510.19

NONFERROUS METALS & ALLOYS:

The American Brass Co., Waterbury, Conn., tubing	$26,309.00

OTHER MACHINERY:

American Machine & Metals, Inc., New York, fans	$23,164.80
Jones & Lamson Machine Co., Springfield, Vt., machines, thread	23,016.36
Henry Prentiss & Co., Inc., Boston, boring, drilling and milling machines	22,338.00
The Bullard Co., Bridgeport, Conn., mills, boring, vertical	39,554.64
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn., machine, jig boring, precision	12,478.00
Onsrud Machine Works, Inc., Chicago, woodworking mach.	88,415.00
International Business Machines Corp., Washington, key punch parts	19,778.36
Worthington Pump & Machinery Corp., Harrison, N. J., pumping units	185,467.00
Gloekler Mfg. Co., Erie, Pa., refrigerators	33,632.50
Sanitary Refrigerator Co., Fond du Lac, Wis., refrigerators	26,050.00
Allis-Chalmers Mfg. Co., Milwaukee, Wis., tractors	16,042.00
Singer Sewing Machine Co., New York, sewing machines	54,536.25

ELECTRICAL APPARATUS & SUPPLIES:

Gleason Works, Rochester, N. Y., generator	$11,326.05

TRANSPORTATION EQUIPMENT:

Wright Aeronautical Corp., Paterson, N. J., engine parts	$202,800.09
Aerial Machine & Tool Corp., New York, adapter assembly	14,401.90
Brooks Equipment & Mfg. Co., Knoxville, Tenn., stone moving equipment	Indefinite
Dempster Brothers, Inc., Knoxville, Tenn., stone moving equipment.	Indefinite
Mack International Motor Truck Corp., Philadelphia, trucks	11,060.00

Small Companies Urge Steel Wage Hearings Be Reopened

SEEKING an investigation of the plight of the small steel companies, a committee of small Eastern producers has petitioned the United States Department of Labor for a reopening of the hearing of the Public Contracts Board on prevailing minimum wages in the steel industry.

The hearing was held last July at the request of the Steel Workers Organizing Committee in a proceeding under the Walsh-Healey Act for a determination of such wages by the Secretary of Labor.

Many small companies would be ruined, the petition holds, by the present recommendation of the board which proposes a blanket wage rate for steel common labor of 62½c. throughout the country (except 45c. in the South) regardless of rural, urban, village or other differentiation of localities.

Charges Politics

Charges that the administration had played politics with the Public Contract Board's report on prevailing minimum wages in the steel industry were made by Roberts B. Thomas, New York, counsel for the petitioning steel companies, in commenting upon the petition for a rehearing. He said:

"Circumstances strongly support the suspicion that political considerations have played a part in this whole matter. In the first place a summary of the report was released just before the recent election. The news of the board's report was given wide publicity in the sections affected and particularly in eastern Pennsylvania on the day before election.

"Meanwhile, nothing but a press release was available to the companies affected by the report. Washington refused to disclose its full text.

"Eventually, under a bombardment of protesting demands, a full text of the report was released. Then it was discovered that it contained a minority report by one of the three members of the board, a fact previously concealed, and to which no reference was made in the press release on the report made just before the election."

General Disturbance Seen

The petition alleges that the board has not properly applied the provisions of the act in recommending a prevailing minimum wage for the North of 62½c. an hr., because it fails to give effect to long existing wage differentials among the localities in which the plants of the steel industry are located.

The petition further asserts that a determination in accordance with this recommendation of a blanket rate in the North and West will result in a general disturbance of wage rates throughout the steel industry and also in other industries having plants in the localities where steel plants are located.

The petition affirms that "many of the smaller companies are specialists" and able to survive because of many factors different from those affecting the large companies.

"To do much of their work in the manner of the larger producer would

their greater factor of safety insures maximum service
T-J HYDRAULIC CYLINDERS
not only "look the part", they ARE capeble of handling the tougher jobs. They are designed throughout to have NOT LESS THAN a factor of safety of 8 for use with pressures of 1000 lbs. per square inch. The heads are steel. The tie rods and piston rod are alloy steel. Pistons of greater width provide better alignment.
These and additional features of construction of T-J Hydraulic Cylinders are described in catalog No. H-37. This also contains engineering information to assist you in making the proper selection.
TOMKINS-JOHNSON
628 North Mechanic St., JACKSON, MICH.
Agents in Principal Cities.

THE IRON AGE 1939 ANNUAL ISSUE

January 5, 1939

CONTAINING:

Charts, tables and summaries presenting the vital statistics of the metal working industry. Articles covering technical and market developments.

DISTRIBUTION:

To over 15,000 regular subscribers including 1800 in Canada and abroad.

PLUS:

A preview, "The Metal Working World of Tomorrow," initiating the most helpful and effective editorial campaign ever attempted by any publication, directed toward aiding industrial executives in the metal working industry to exercise the most effective control of production at lower costs.

2000 Extra Distribution of the Issue Without Charge

YOU STILL HAVE TIME

THE IRON AGE

239 WEST 39th STREET
NEW YORK

Gentlemen:

It is my hope that I have visualized in previous letters and ads. what The Iron Age Annual will mean to you in presenting your selling message to the metal-working industry.

Many manufacturers who have already sent in their reservations evidently believe that the small expense involved will be warranted.

Perhaps because they realize how this issue is going to help executives in solving their problems of tomorrow. Perhaps because of the 2,000 extra distribution at no additional cost. Perhaps because they know how these Annual Issues are always used for reference.

In any event the response I've received has been beyond expectations.

Be "among those present." Please make your space reservation now. Your copy and plates should reach us not later than Saturday, December 17th.

Sincerely yours,

C S BAUR General Advertising Manager.

TO ARRANGE TO HAVE THIS ISSUE CARRY YOUR SELLING MESSAGE. BUT YOU SHOULD ACT NOW!

TWIN PLANTS *Insure* SPRING DELIVERIES

Meeting the exacting demands of leading mass-production industries—successfully—is a matter of record here. Either or both B-G-R plants are ready to plunge into your spring requirements—with engineering and design assistance—or just fast production and delivery.

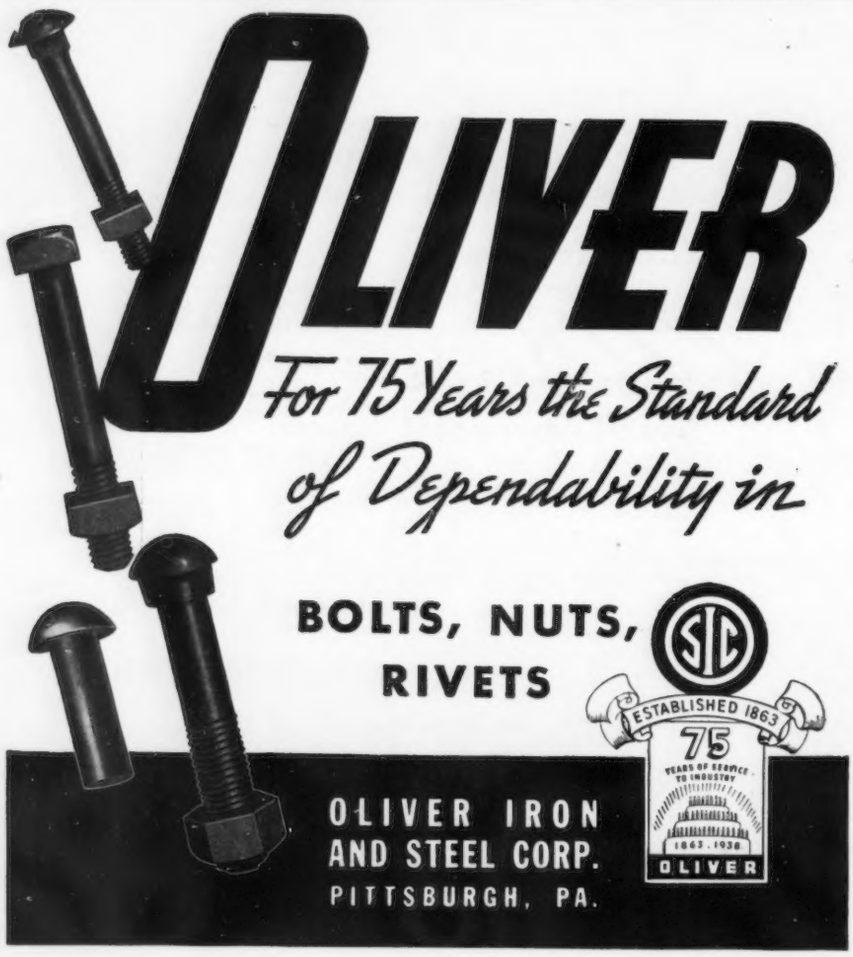
Each B-G-R plant is similarly equipped with modern machines, heat treating equipment, laboratories—and what's equally important—a goodly supply of spring materials in many sizes and kinds.

It's good insurance for your assembly lines to use B-G-R service in the form of springs, stampings, wire forms

BARNES-GIBSON-RAYMOND

DETROIT PLANT — DIVISION OF ASSOCIATED SPRING CORP. — COOK PLANT

DETROIT, MICHIGAN ← TWO PLANTS → ANN ARBOR, MICHIGAN



OLIVER

For 75 Years the Standard of Dependability in

BOLTS, NUTS, RIVETS

ESTABLISHED 1863 — 75 YEARS OF SERVICE TO INDUSTRY — 1863 1938 — OLIVER

OLIVER IRON AND STEEL CORP.

PITTSBURGH, PA.

be like plowing a backyard with a tractor plow," the petition says.

"Is it the purpose of the board that competition for Government work be limited only to the large companies? *** such a determination as that recommended will be disastrous to many small producers, particularly those with plants in the East, whose services the Government has accepted in the past and needs now for the furtherance of its plans for national defense."

Investigation Now Wanted

The committee asserts that the board's suggestion that the small companies may be granted exemptions under the act is impractical of operation and that investigation of the position of the small companies should be made now, not after the damage is done. "The board concedes," the petition recites, "that it has not as yet obtained adequate evidence on which to determine the effect of the proposed determination upon the competitive positions of the smaller companies."

The committee of small Eastern steel producers is composed of D. S. Wolcott, vice-president, Lukens Steel Co., Coatesville, Pa.; J. H. Parker, vice-president, Carpenter Steel Co., Reading, Pa.; and John T. Whiting, vice-president, Alan Wood Steel Co., Conshohocken, Pa.

Among the companies represented by the committee in addition to those named above are the following: Atlantic Wire Co., Branford, Conn.; Buffalo Bolt Co., North Tonawanda, N. Y.; Buffalo Steel Co., Tonawanda, N. Y.; Central Iron & Steel Co., Harrisburg, Pa.; Cohoes Rolling Mill Co., Cohoes, N. Y.; Henry Disston & Sons, Philadelphia; Harrisburg Steel Corp., Harrisburg, Pa.; Heppenstall Co., Pittsburgh; E. J. Lavino & Co., Philadelphia; Midvale Co., Philadelphia; Phoenix Iron Co., Phoenixville, Pa.; Rome Strip Steel Co., Inc., Rome, N. Y.; Simonds Saw & Steel Co., Lockport, N. Y.; South Chester Tube Co., Chester, Pa.; Troy Furnace Corp., Troy, N. Y.; Universal-Cyclops Steel Co., Bridgeville, Pa.

Chicagoan Wins Stanley Electric Tool Contest

IN the contest started last September to find the oldest "Mighty Midget" Unishear still in use, Stanley Electric Tool Division, New Britain, Conn., announces that the winner is W. J. Ross, manager of the Chief Sign Co., who owned the oldest "Mighty Midget" and has received a brand new Unishear of the same design. He lives in Chicago.

U. S. Machine Tools Tend To Displace German Tools In British Market

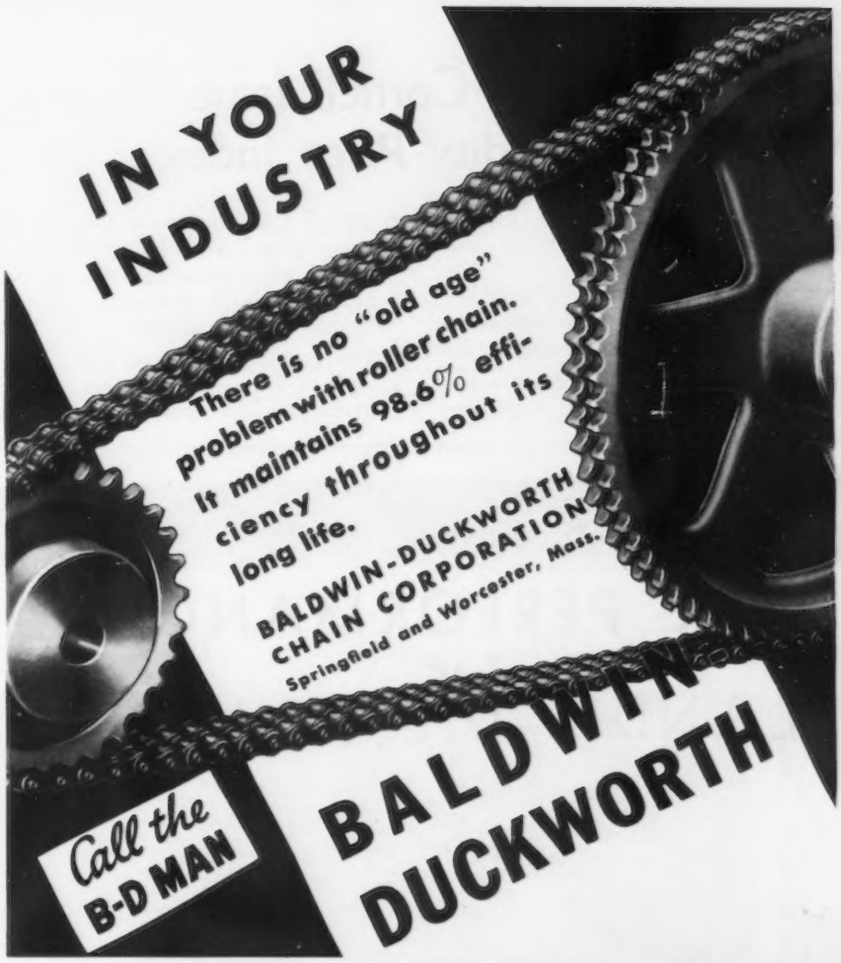
GERMANY continues to supply machine tools in volume to Great Britain and at prices reported to vary between 25 and 40 per cent below prices quoted on comparable products of American manufacture, according to the U. S. Bureau of Foreign and Domestic Commerce. The price differential is not serving, however, to prevent the tendency of British users to demand American machinery from becoming stronger. The explanation lies in an increasing incidence of faulty German components, especially heavy castings and in a growing tendency on the part of German makers to offer money compensation for faulty parts and to refuse to replace them.

Fifty weeks is the average delivery date now current for British produced machine tools. However, with respect to new orders for types employed for quantity production of fighting aircraft propulsion components, no delivery dates are being mentioned. Eighteen weeks is the average American undertaking, but in the more specialized lines a somewhat shorter period is commonly offered.

Some authorities maintain the only way by which British producers can be saved from ruin when domestic armament production declines to or below a maintenance level is for the Government to freeze armament producing machine tools to their foundations and to refuse to permit such machinery to be sold or used domestically for peace production purposes. The British producing trade is preparing to ask that the Government say in advance that it will pursue such a course and is confident that the Government will at least tacitly agree to do so.

Lake Erie Engineering Expands at Buffalo

CONSTRUCTION is under way on an addition to accommodate the engineering department of the Lake Erie Engineering Corp., manufacturers of Lake Erie hydraulic presses and special machinery, Buffalo. This addition will provide triple the present floor space for this department and allow increased room for other departments. Special attention is being devoted to adequate lighting by the use of glass on practically the entire outer wall area and through the installation of modern semi-indirect lighting equipment.


IN YOUR INDUSTRY
There is no "old age" problem with roller chain. It maintains 98.6% efficiency throughout its long life.
BALDWIN-DUCKWORTH CHAIN CORPORATION
Springfield and Worcester, Mass.
Call the B-D MAN
BALDWIN DUCKWORTH

SPRINGS
FOR EVERY MECHANICAL NEED
COIL SPRINGS
FLAT SPRINGS
WIRE SPECIALTIES
WIRE FORMS
MANY of the country's foremost manufacturers use American Springs exclusively—having adopted them after the most severe and rigid tests. Similar tests may prove to you that the dependability and uniformity of American Springs would form your strongest assurance against "spring failure" in your products.
SNAP RINGS
LOCK SPRINGS
SPECIAL SPRINGS
from Every Type of Wire up to & including ½ dia.
Send for Quotations
AMERICAN SPRING
AND MANUFACTURING CORPORATION
PARK AVE. HOLLY MICHIGAN

General Motors, Cornell Issue World Commodity Price Index

GENERAL MOTORS CORP. and Cornell University announce inauguration of the first weekly world commodity price index, based on identical commodities and weights, ever to be offered to the public. The index results from a cooperative effort by the two organizations and will be known as the General Motors-Cornell World Price Index.

This index, covering 40 identical commodities for each country so as to facilitate world comparisons, will be released each Monday morning. Collection of the commodity prices from sources over the world and computation of the index numbers are being handled jointly by General Motors and the New York State College of Agriculture at Cornell. The prices used in the index are being collected weekly from the most responsible agencies in the different countries, cabled from General Motors offices abroad to the headquarters of General Motors Overseas Operations in New York, then transmitted to Cornell.

List of Countries

Countries from which prices are being used at present include: United States, Canada, United Kingdom, Australia, New Zealand, The Netherlands, Belgium, France, Sweden and Finland.

No prices are included from countries in which artificial restrictions on exchange rates exist. It is expected that additional countries will be added to the list from time to time.

Among the 40 basic commodities included in the index figure are: grains, livestock, livestock products, fats and oils, coffee, cocoa, tea, sugar, textiles, fuels, metals, rubber, hides, lumber, newsprint and linseed oil.

In computing this index each commodity is weighted according to its relative importance in world production, identical weights for the commodities being used in the index of each individual country. In the course of the computation at Cornell, the indexes from the various countries, which are in terms of paper currencies, are reduced to a comparable basis in gold and then weighted in accordance with the relative importance of the world trade of each country.

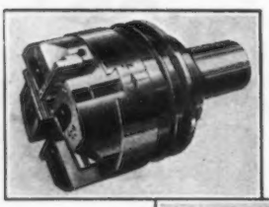
The General Motors-Cornell World Price Index (40 Basic Commodities) is given, along with figures for comparison purposes, in the following table:

	World in gold	United States in gold	United States in currency
1910-1914	**100**	**100**	**100**
Year 1926	144	150	150
February, 1933	67	65	65
April, 1937	78	83	141
November, 1937	71	69	116
1938:			
June	64	63	107
July	65	64	108
August	63	63	107
September	62	63	107
October	61	63	106
Weeks ending:			
October 29	61.2	62.4	105.6
November 5	61.1	62.6	105.9
November 12	60.8 p	62.4	105.7
November 19	*	*	*
November 26	*	*	*

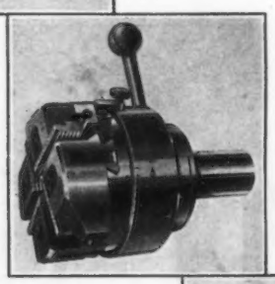
p Preliminary.
* To be supplied later.

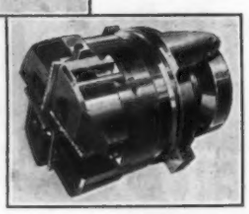
LANDIS Equipment for ALL threading operations

FOR PERFORMANCE
Use
LANDIS DIE HEADS



For all types of machines on which threading operations are handled.





Made in various sizes with capacities ranging from $\frac{3}{16}$" to 4" inclusive.

LANDIS Die Heads give outstanding performance in production, accuracy and economy. This is due largely to the distinctive design of the patented LANDIS Chaser with its long life and the free cutting action of a lathe tool.

Have you heard about the **LANDIS** *Survey Plan? Write us today for Information*

LANDIS MACHINE CO., Inc.
WAYNESBORO, PENNA.

PWA Claims Share Of Credit for Steel Industry's Revival

WASHINGTON.—Paralleling its increased allotments with the rise in the steel ingot rate as reported by THE IRON AGE, the PWA, which is eager to become a permanent set-up, made public another press announcement last Thursday designed to show the importance the spending agency played in stimulating the basic industries. In a report to Public Works Administrator Harold L. Ickes, his assistant, Howard A. Gray, summarizing PWA authorizations beginning June 22, said that during the period PWA was making its allocations, the steel production index jumped from 28 to 62.5 per cent, the latter rate being for the week ended Nov. 15.

In a truant moment of diffidence, however, Mr. Gray said that "the PWA could not, and does not, claim full credit for the revival of the steel business, as many other factors in the industrial field played their part." But, it was added, "the manner in which the set-up in production coincided with the release of millions of dollars worth of PWA construction contracts and orders for materials indicate that the program was at least in part responsible." On the basis of the funds authorized by Congress the Bureau of Labor Statistics said that more than $280,000,000 worth of steel would be needed to carry out the PWA Act of 1938.

Six Per Cent of Sales

The estimate recalls that PWA expenditures for steel during the July, 1933-July, 1937, period, amounting to $456,736,035, represented only slightly more than 6 per cent of total steel sales during that period.

The point is made that the rise in steel production would have taken place even without the aid of the expensive PWA though obviously its allocations have had some degree of stimulus on industry.

The simultaneous rise in PWA authorizations and the steel ingot rate is set forth in the PWA statement as follows:

Week Ending	Approximate Value of PWA Construction Authorized As Of Same Date	Per Cent of Ingot Capacity for Week Ending Same Date (Reported by Iron Age)
June 28	$450,000,000	28
July 19	785,124,870	36
Aug. 23	1,225,483,505	43
Sept. 20	1,437,079,761	47.5
Oct. 18	1,450,342,090	51
Nov. 15	1,477,995,426	62.5

The statement said that after June 22, an average of approximately 1400 projects were approved monthly, releasing a monthly average of around $340,000,000 worth of construction. This continued, it was pointed out, until more than 7300 projects calling for $1,677,995,426 worth of construction had been authorized.

It was added that in the field of structural steel, the American Institute of Steel Construction reports that for the second quarter ending June 30, production was 318,287 tons, while the third quarter output was 366,575 tons. A comparable increase, it was stated, was also indicated in the production of reinforced bars "which for the second quarter was 178,140 tons, while at the end of the third quarter the figure had jumped to 215,487 tons."

William Jessop & Sons, Inc., tool steels, has opened its own steel warehouse and offices at 2706 West Van Buren Street, Chicago, and has appointed the Cold Finished Steel Sales, Inc., 1230 Callowhill Street, Philadelphia, as sole agents and distributers for its Sheffield tool steels in Pennsylvania, Delaware and southern New Jersey.

CLEVELAND TRAMRAIL

MATERIALS HANDLING EQUIPMENT

FOR WAREHOUSING

● Another Tramrail Transfer Bridge installation—this one—48′ span - 3 runway; all motions of bridge, carrier and hoist are motorized and floor controlled through push buttons and contactor panel.

ALSO BUILDERS OF

CLEVELAND CRANES

FOR EVERY INDUSTRY

CLEVELAND TRAMRAIL

Division of

THE CLEVELAND CRANE & ENGINEERING CO.

1115 Depot St.

WICKLIFFE, OHIO

Or consult your phone directory under Cleveland Tramrail.

Welsh Tin Plate Mills in Merger

LONDON (*By Mail*).—The merging of five independent Welsh tin plate concerns into one organization with a capital of £1,000,000 ($5,000,000), just announced, is designed to place a number of the older mills in West Wales upon an economic basis. It is intended that these mills should be brought thoroughly up to date, and should then be capable of meeting to a considerable extent the competition which is expected from Ebbw Vale when the huge plant of Richard Thomas & Co. is in full operation there.

The possibility is also envisaged of a strip mill being erected later if this should prove practicable. Representatives of the five concerns have investigated this project and have visited the United States with the object of securing the British rights of certain patents which are competitive with those obtained by Richard Thomas & Co.

Several proposals have been put forward for the erection of a strip mill, but so far the capital expenditure essential—some $35,000,000—has prevented any real progress with this project.

The new merger will create the third largest concern in the Welsh tin plate industry, ranking after Richard Thomas & Co., and the Briton Ferry Steel Co. The five companies involved are the Western Tinplate Works, Ashburnham Tinplate Co., Teilo Tinplate Co., Old Castle Iron & Tinplate Co., and Kidwelly Tinplate Co.

Kuhlman Electric Buys Detroit Firm

KUHLMAN ELECTRIC CO., Detroit, has purchased the Detroit Electric Furnace Co. business, Bay City, Mich., and will hereafter operate it as the Detroit Electric Furnace Division of Kuhlman Electric Co., Bay City, Mich.

There will be no interruption to the servicing of Detroit electric furnaces and the same sales, service and production personnel which have been with the company for many years will continue in the conduct of the company's business under the direction of A. E. Rhoads.

Precision Machine Tools Built by Welding

(CONCLUDED FROM PAGE 40)

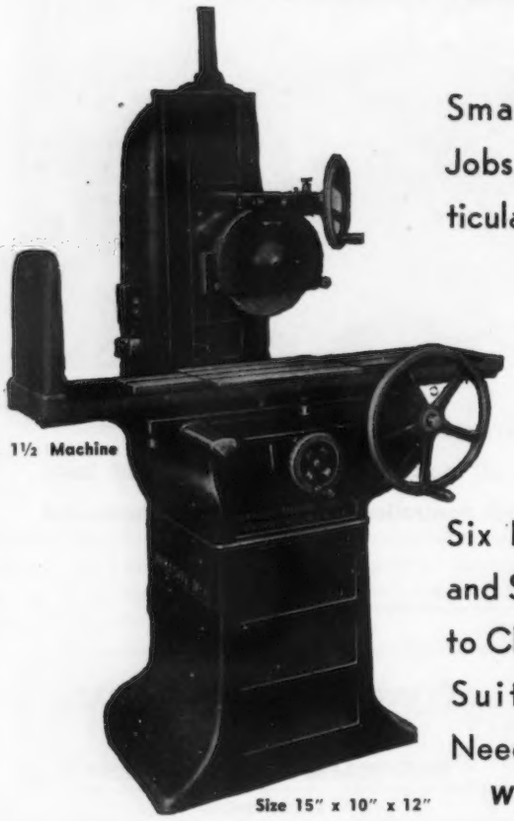
all welded-steel construction mills a difficult and interesting job. Present time for milling this piece is 8 hr. with 45 min. for hand dressing time. The time used to be 48 hr. on a good milling machine, with 8 hr. hand dressing time.

This bed is in one piece, eliminating the making of a bolted joint, yet its weight is moderate. The internal ribs are distributed according to the rigidity requirements at that particular section. We can build a bed 10, 15, 20, 25 ft. long using the same equipment and design. In short, the sales department may sell a machine exactly suited to the customer's needs, and whether it is 10 or 25 ft. long, we can fabricate it with equal facility. This has been our practice and is well exemplified by the use we have made in building the Hydro-Tel.

We have built numerous machines with details partly or completely of steel. Figs. 6 and 7 are views of another special steel bed Hydromatic milling machine. The spindle carrier is made as a casting because it is rather intricate. A casting was economical to use, especially so in this case, because more than one was to be made.

(TO BE CONCLUDED)

ABRASIVE
SURFACE GRINDERS for ALL JOBS



No. 1½ Machine

Small Jobs, Bigger Jobs, Hard Jobs, Particular Jobs.

★

Six Different Styles and Sizes from Which to Choose a Machine Suited to Your Needs.

Size 15" x 10" x 12"

Write for Circular

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE, R. I.

. . . OBITUARY . . .

B. E. V. LUTY, iron and steel editor of *American Metal Market*, New York, died at his home in Pittsburgh of a heart attack on Nov. 30, aged 68 years. He was a native of Pittsburgh and was graduated from the University of Pittsburgh in 1891.

Mr. Luty started his business career as a structural draftsman for Carnegie, Phipps & Co., one of the predecessor companies of the Carnegie-Illinois Steel Corp. In 1892 he resigned to become mechanical editor of *American Manufacturer and Iron World*, and later became proprietor of *Tin and Terne*, which he edited until 1902. He became identified with the *American Metal Market* in 1900. He wrote at various times for many trade publications and was a member of the Engineers Society of Western Pennsylvania.

❖ ❖ ❖

WILLIAM J. BRADY, aged 44, assistant secretary of H. C. Frick Coke Co., Pittsburgh, and its affiliated companies, died at his home in Pittsburgh, Nov. 30. Mr. Brady went to Pittsburgh as secretary to the president 10 years ago, and had been assistant secretary for the past three years.

❖ ❖ ❖

NATHAN KOMITO, president of National Copper Refining & Smelting Co., Cleveland, until his retirement nine years ago, died Nov. 29 in Jacksonville, Fla., at the age of 64 years.

❖ ❖ ❖

B. H. KNAPP, vice-president of Norge and Detroit Vapor Stove divisions of the Borg-Warner Corp., died at his home Dec. 1 after an illness of five months. Mr. Knapp was a veteran of the automobile business, having started with the Durant Dort Carriage Co. of Flint. Later he went with the Chevrolet Motor Co., but in 1919 was transferred to the Canadian Products division of General Motors of Canada, as director of purchases. In 1923 he went to Detroit as purchasing executive for the Detroit Gear & Machine Co. He became interested in mechanical refrigeration and in 1926 helped form the Norge Rollator Refrigeration Co. In 1929 both the Detroit Gear & Machine Co. and the Norge Rollator Co. were merged with the Borg-Warner Corp. Mr. Knapp was born in Washington, 44 years ago, was educated in Flint, Mich., and went to Detroit in 1922.

EDWARD J. FISHER, of E. M. Coleman & Co., was buried in Detroit Dec. 1. Born in Zanesville, Ohio, in 1883, he had lived in Detroit 43 years.

❖ ❖ ❖

EDWIN FROGGETT, who managed blast furnaces at Chattanooga, Tenn., Birmingham, Saxton, Pa., Scottdale, Pa., and Kittanning, Pa., before his retirement 30 years ago, died Nov. 26 in Youngstown, at the age of 84.

❖ ❖ ❖

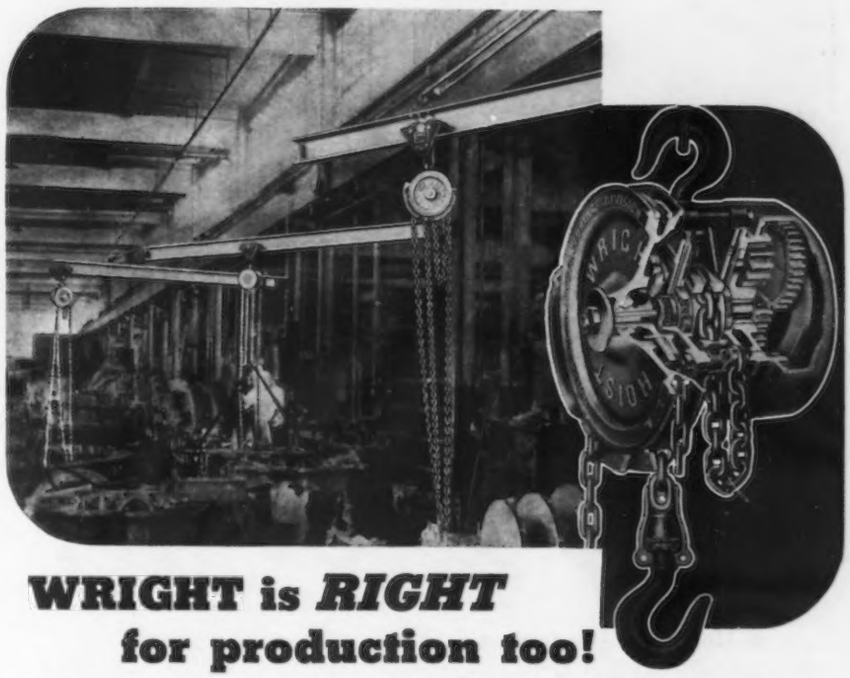
JOHN LOUIS VALLETT, aged 73, former superintendent of the old Poland Avenue plant of National Tube Co. in Youngstown, before it was dismantled, died Nov. 28 in Youngstown. During his career he was master machinist and superintendent of mills at Chester, Pa., and Parkersburg, W. Va., among others.

❖ ❖ ❖

ARTHUR E. MAXIM, assistant general manager of the State Tool & Cutter Co., was buried in Detroit Nov. 30. Born in Boston, in 1850, Mr. Maxim went to Detroit 20 years ago.

❖ ❖ ❖

RICHARD J. FAVORITE, mechanical engineer with Stone & Webster, Inc., for 14 years and a graduate of the Massachusetts Institute of Technology, died at his home in Waban, Mass., Nov. 30. Mr. Favorite was born in Chicago 47 years ago.



WRIGHT is *RIGHT* for production too!

● This illustration shows the assembly of parts in the plant of a large eastern manufacturer. Here, the Wright Improved High Speed Hoist, in combination with Wright Trolleys and jib cranes, greatly facilitates the assembly of comparatively heavy parts—a Wright job—done RIGHT. • The Wright Improved High Speed Hoist embodies so many features that make for safety, speed, ease of operation and long life, that you really need the Wright catalog to get the complete story. It is replete with exceptionally complete data dealing with hoisting and material handling problems. Write for it.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE COMPANY, INC.
YORK, PENNSYLVANIA
In Business for Your Safety

WRIGHT *Improved High Speed* HOISTS

Burden Iron Co. Stops Work at 100

THE Burden Iron Co., Troy, N. Y., a century-old concern will cease operations within two weeks, the company has announced. The business was established by Henry Burden, who in 1835 patented a machine for making horseshoes. Mr. Burden was also the inventor of the hook-headed spike and of the Burden rotary squeezer.

James M. Swank's book, "The Manufacture of Iron in All Ages," refers to the beginning of this business in the following paragraph:

"In *Hunt's Merchants' Magazine* for 1844 horseshoes made by machinery were cited as an illustration of the achievements of American inventive genius down to that time. We quote from the magazine as follows: 'Horseshoes furnish a similar proof of the bearing of the progress of inventions. An improved kind of horseshoes, made at Troy, N. Y., for some time past, is now sold at the price of only five cents per pound, ready prepared, to be used in shoeing the animal. At a factory recently erected 50 tons of these are now turned out per day; and, it is believed, they can be made and sent to Europe at as good a profit as is derived from American clocks, which have handsomely remunerated the exporter.' These horseshoes were made at the Burden iron works, formerly the Troy iron and nail factory, which are still employed in their production."

Easy does it!

● Handling green cores in this foundry is a job reserved entirely for Baker Trucks. In general service their heavier loads and quicker trips show substantially lowered costs. But the big saving is in eliminating core loss. Their smoother lift and starting prevents shock and the resulting core breakage which formerly occurred with other equipment.

Savings like this are only one of the many ways Bakers are cutting costs in thousands of plants. They can save for you, too. Get all the facts from the Baker Material Handling Engineer. Have him estimate the savings possible in your plant. Write today.

OLDEST MANUFACTURER Baker OF ELECTRIC VEHICLES

BAKER INDUSTRIAL TRUCK DIVISION
OF THE BAKER-RAULANG COMPANY
2175 WEST 25TH STREET • CLEVELAND, OHIO

Steel Employment Rises For 3rd Consecutive Month

FOR the third consecutive month, employment rose in the steel industry during October, according to the American Iron and Steel Institute. A total of 436,000 workers were employed by the industry during the month, an increase of 5000 compared with September.

Pay rolls of the industry totaled $56,176,000 during October, the largest total for any month since November, 1937. In September, pay rolls amounted to $52,365,000. In October a year ago the industry disbursed $76,191,000 in pay rolls to 587,000 employees.

Hourly earnings of wage-earning employees in the steel industry averaged 83.2c. per hr. in October, which compares with 83c. an hour in September, and 82.5c. in October, 1937.

Wage earners worked an average of 31.2 hr. a week in October, compared with 30 hr. in September, 29.4 hr. in August, and 24.3 hr. in July. In October, 1937, the average was 31.9 hr.

Automotive Industry Employment Climbs

NEW YORK.—Payrolls in 25 manufacturing industries rose 5.3 per cent and employment advanced 3.7 per cent in October as compared with September, according to figures received from manufacturers by the statistical division of the National Industrial Conference Board. Outstanding were the gains of 44.2 per cent in payrolls and 38.6 per cent in employment reported by the automobile industry.

E. Zimmerli, 404 Columbia Bldg., Pittsburgh, is disposing of the machinery and stock of the Pittsburgh Cold Rolled Steel Co., Verona, Pa., which company is being liquidated.

British Steel Makers Have Large Deficit on Materials Bought Abroad

LONDON (*By Mail*).—The operations of the British Iron and Steel Corp., formed in 1935 to conduct commercial business for the British Iron and Steel Federation, have resulted in a substantial book deficit. This corporation is responsible for large-scale imports of steel and raw materials for steel mills and during the period of scarcity of domestic supplies last year it operated on a large scale.

The deficiency, understood to total about £4,500,000 ($22,500,000), does not represent a trading loss, but arises from methods of operation. The corporation was empowered by the steel industry to purchase material at the ruling prices abroad and resell to the British manufacturers at the British value, which was substantially lower due to the stabilization policy of the British Iron and Steel Federation. This resulted in the deficit, which is now to be met by a levy over the entire industry. But for the centralized buying plan still higher prices would have had to be paid by individual consumers.

The differences in the buying and British prices of scrap purchased in the United States last year was in some cases as great as $7.50 a ton. The purchases were passed on to consumers at cost. •

European Scrap Cartel Not to Buy at This Time

LONDON (By mail).—The International Scrap Cartel held a conference in London in late November to consider the allocation of scrap acquired some time ago. No consideration was given to the question of further purchases, which at present are not thought to be necessary. The final meeting of the year, scheduled for mid-December, may consider this matter.

Cooper Union Design Courses To Include Shop Work

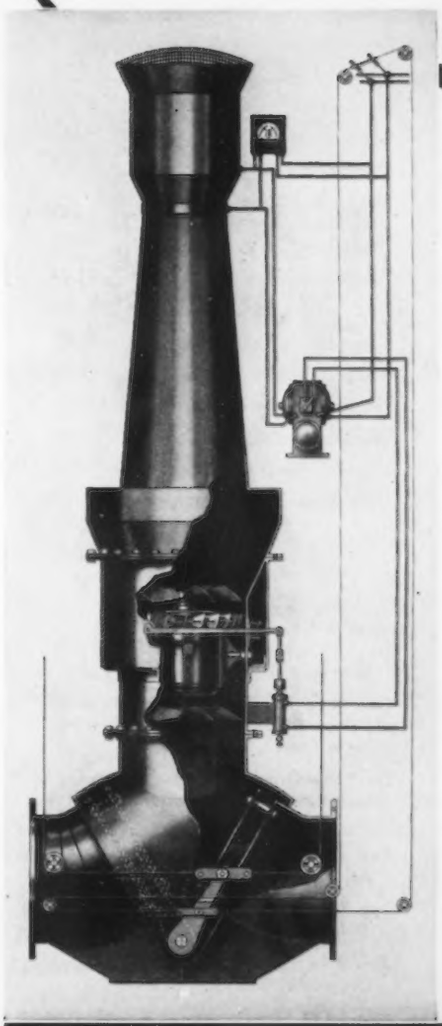
EXPANSION of the curriculum in industrial design in the Cooper Union Art School, New York, to include shop work with power tools has been announced. Theodore Postma, laboratory and shop director for Walter Dorwin Teague, industrial designer, will have charge of the new program, which will provide extensive training for students specializing in industrial design.

Continental Industrial Engineers, Inc., with general offices at 201 North Wells Street, Chicago, has opened a Detroit area office at 8186 Livernois Avenue, Detroit, with Charles Miller as branch manager. Mr. Miller has for many years been connected with engineering and operating activities at the Dodge Bros. Detroit plant.

Indianapolis Purchasing Agents Exhibit Feb. 14-17

THE Purchasing Agents Association of Indianapolis, Ind., has set Feb. 14-17 for its annual show to be held in the Manufacturers' Building at the Indiana State Fair Grounds, Indianapolis. Firms desiring to exhibit are invited to communicate with Dwight S. Ritter, chairman, 305 Merchants Bank Building, Indianapolis.

BRASSERT COMBUSTION UNIT FOR REGENERATIVE or RECUPERATIVE FURNACES



A self-contained unit including Reversing Valve, Blower, Air Measuring Tube, Air Flow Regulator, and Indicating Gauge for Air Flow and Fuel Flow.

The Blower is the Wing air foil type motorized, constant speed, high efficiency Blower, with capacity up to 15,000 cubic feet per minute.

The Regulator is of Askania ratio type, capable of compensation for variation in temperature and pressure.

The indicator shows at a glance excess or deficiency of air in percentage.

The reversing valve fits into the automatic reversing system of any regenerative furnace. Reversal of the cocks in the impulse lines for measurement of gas flow is automatically done. For recuperative furnaces, a plain elbow takes the place of the reversing valve. The over-all height of the assembly as shown is approximately seventeen feet. The measuring tube may be horizontal, reducing the height to nine feet.

For gas-tight furnaces, where flue gas is free from contamination by air leakage, the measuring tube is omitted and position regulation of the air dampers is substituted, with an Askania adjustable cam used as the regulating device.

This assembly is low-priced, compact, convenient, positive, accurate, efficient and durable.

It will improve the performance of your open hearth or heating furnace.

For Particulars, Write to:

H. A. BRASSERT AND COMPANY

310 South Michigan Avenue, CHICAGO, ILLINOIS

436 Seventh Avenue, PITTSBURGH, PENNSYLVANIA

. . . THE NEWS IN BRIEF . . .

Strikes hinder auto plants' efforts to fill orders. November registrations up 54 per cent, nearing 1937 levels. Steel price announcement counted on to increase orders.—**Page 52.**

United States Steel Wire Spring Co. expands.—**Page 55.**

Industrialists differ over value of incentive taxes to encourage profit-sharing. WPA claims share of credit for steel revival.—**Page 56.**

War Department announces awards totaling $1,030,968 under its ordnance procurement program for special machinery, guns, and ammunition.—**Page 58.**

Wage increases needed for those in lower brackets to bring recovery, Dr. Isador Lubin tells Monopoly Committee hearing.—**Page 59.**

Indefinite extension of present freight rates on soft coal beyond Dec. 31 is approved by Interstate Commerce Commission.—**Page 61.**

Government purchases for latest reported week total $342,953 for iron and steel products, $544,472 for machinery.—**Page 62.**

Edward R. Stettinius, Jr., chairman of U. S. Steel Corp., approves Social Security Act.—**Page 62.**

Small companies urge that Public Contracts Board reopen hearings on minimum wages.—**Page 63.**

Chicagoan wins Stanley electric tool contest.—**Page 66.**

Lake Erie Engineering Corp. expands at Buffalo.—**Page 67.**

United States machine tools tend to displace German tools in British market.—**Page 67.**

General Motors Corp. and Cornell University inaugurate first weekly world commodity price index.—**Page 68.**

PWA claims share of credit for steel industry's revival.—**Page 69.**

Welsh tin plate mills in merger.—**Page 70.**

Kuhlman Electric Co. purchases business of Detroit Electric Furnace Co., Detroit.—**Page 70.**

Burden Iron Co., 100-year-old concern of Troy, N. Y., will go out of business within two weeks.—**Page 72.**

SECTIONS INDEX

Personals	76
Obituary	71
Steel Ingot Production	87
Summary of the Week	88
Comparison of Prices	89
Pittsburgh, Chicago, Cleveland, Philadelphia and New York Markets	90
Fabricated Steel	94
Non-ferrous Market	95
Scrap Market and Prices	96-97
Finished Iron & Steel	98-99
Pig Iron & Raw Material Prices	100
Warehouse Prices	101
Machine Tool Activity	109
Plant Expansion & Equipment	104

MEETINGS

Dec. 5 to 9 — American Society of Mechanical Engineers, New York.

Dec. 5 to 10—National Exposition of Power and Mechanical Enginering, New York.

Dec. 15—Grinding Wheel Manufacturing Association, Atlantic City, N. J.

Dec. 16—Abrasive Grain Association, Atlantic City, N. J.

Jan. 10 to 12—Institute of Scrap Iron and Steel, St. Louis.

Jan. 9 to 13—Society of Automotive Engineers, Detroit.

Feb. 14 to 17—Purchasing Agents Association, Indianapolis.

April 26 to 29—Electrochemical Society, Columbus, Ohio.

Payrolls in 25 manufacturing industries rose 5.3 per cent in October, with automotive business reporting sharpest gain, National Industrial Conference Board reports.—**Page 72.**

Steel employment advances for third consecutive month, American Iron and Steel Institute reports.—**Page 72.**

European scrap cartel not to buy at this time.—**Page 73.**

Copper Union designs courses to include shop work.—**Page 73.**

Indianapolis Purchasing Agents' Association sets Feb. 14-17 for annual show at Indiana State fair grounds.—**Page 73.**

British steel industry has deficit of $22,500,000 on scrap and other materials bought abroad.—**Page 73.**

Colorado Fuel Co., Sloss-Sheffield Steel & Iron Co., Woodward Iron Co., Reeves Steel & Mfg. Co., other companies protest Public Contracts Board steel wage recommendations.—**Page 83.**

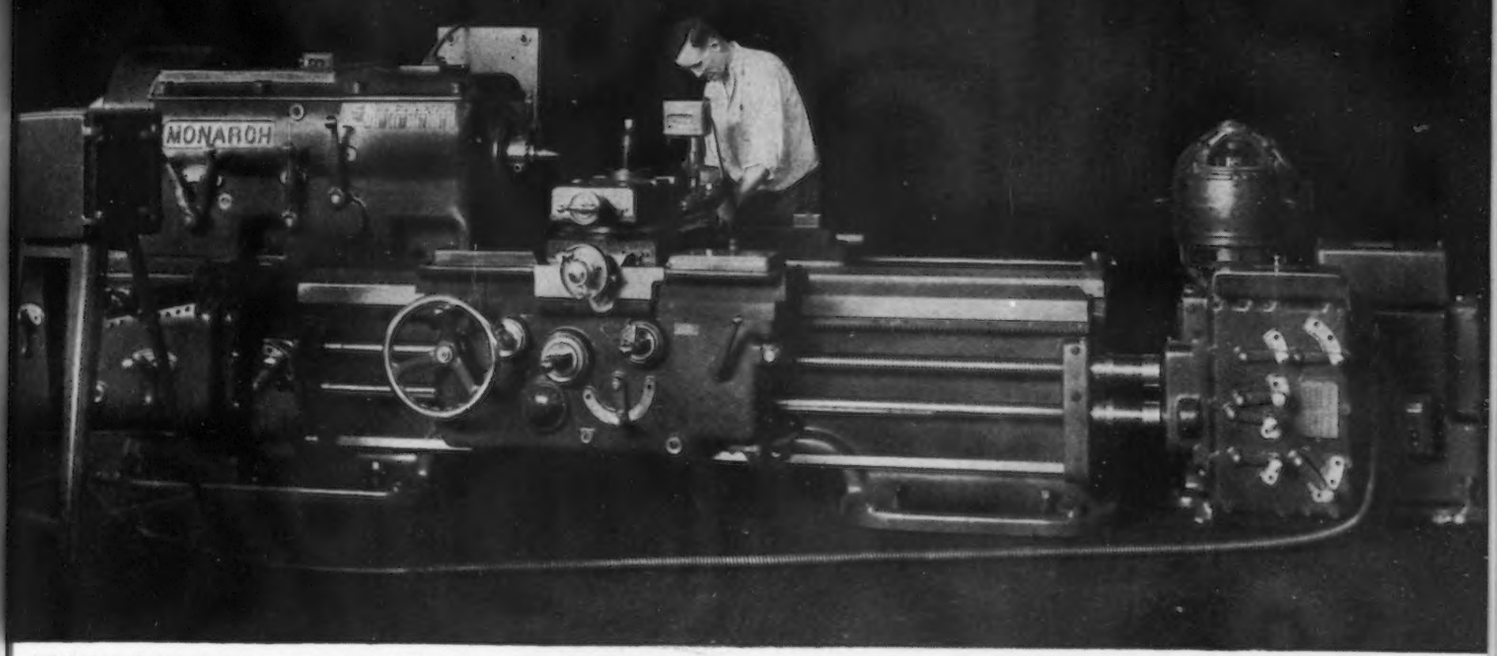
Edsel B. Ford tells Monopoly Committee members that his company's free licensing policy has encouraged competition in the automotive industry.

Television is still in its infancy, with important technical problems to be overcome, Dr. W. R. G. Baker, General Electric Co. engineer, says.—**Page 84.**

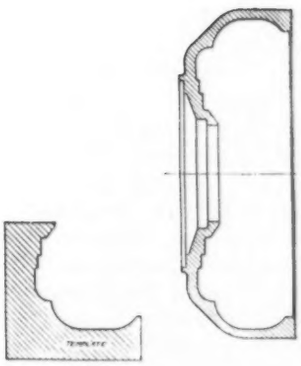
Granite City Steel Co. announces $1,500,000 to $3,000,000 expansion; will add hot, cold reducing mills.—**Page 84.**

Administrator Elmer F. Andrews broadens scope of Wage-Hour Law where employers' goods are destined to move in interstate commerce.—**Page 85.**

MONARCH KELLER



36" MONARCH MODEL NN KELLER CONTROLLED LATHE.



This illustration shows a difficult boring job made easy by the Monarch-Keller Lathe, and the thin metal template which guides the tool with such uncanny accuracy.

DIFFICULT JOBS MADE *Easy* ON A MONARCH-KELLER!

THE more difficult most machining jobs are when done by other means, the more they lend themselves to the Monarch-Keller method.

The illustration above shows one of a number of large Monarch-Keller lathes furnished for a very difficult job of boring and facing. These lathes are driven by 30 h. p., 4 to 1 D. C. variable speed motors, whose controls are arranged so as to automatically maintain a constant surface cutting speed on all diameters. The driving motor on the Keller control unit is synchronized with the main drive motor, thus assuring uniform feeds at all speeds.

As a result of Monarch research and pioneering, Monarch products cover the turning machine field. We suggest that all your turning problems, from the simplest to the most difficult, be submitted to Monarch's Engineering Staff.

Monarch research and development marches steadily forward.

A catalog fully describing work which may be done on the Monarch-Keller controlled lathe will gladly be sent to anyone interested.

THE MONARCH MACHINE TOOL CO., Sidney, Ohio, U.S.A.

MONARCH LATHES
COVER THE TURNING FIELD

Newark Sales Office: 1060 Broad Street • Pittsburgh Sales Office: 604 Chamber of Commerce Bldg. • Chicago Sales Office: 622 W. Washington Boulevard • Indianapolis Sales Office: 3115 North Meridian Street. *Agencies in principal industrial centers of this and foreign countries.*

. . . PERSONALS . . .

E. H. HEILSTEDT has been appointed assistant to the superintendent of industrial relations and A. H. KOFOED director of personnel and employment at Gary works of Carnegie-Illinois Steel Corp.

Mr. Heilstedt has been associated with Carnegie-Illinois since Aug. 5, 1915, when he started as a clerk in the storehouse at Gary works. A year later he was promoted to the post of chief clerk in the machine shop and served in that capacity until 1928 when he was appointed assistant superintendent of employment. In September, he was advanced to the superintendency of employment and remained in this position until his current appointment. Before going to Gary works he had been in the hardware business.

Mr. Kofoed began service with the corporation on March 9, 1936, as director of personnel and employment at South works, and continued in that position until his promotion to Gary works. Prior to his employment at South works, he was connected with various phases of personnel work in the industrial field.

E. H. HEILSTEDT

❖ ❖ ❖

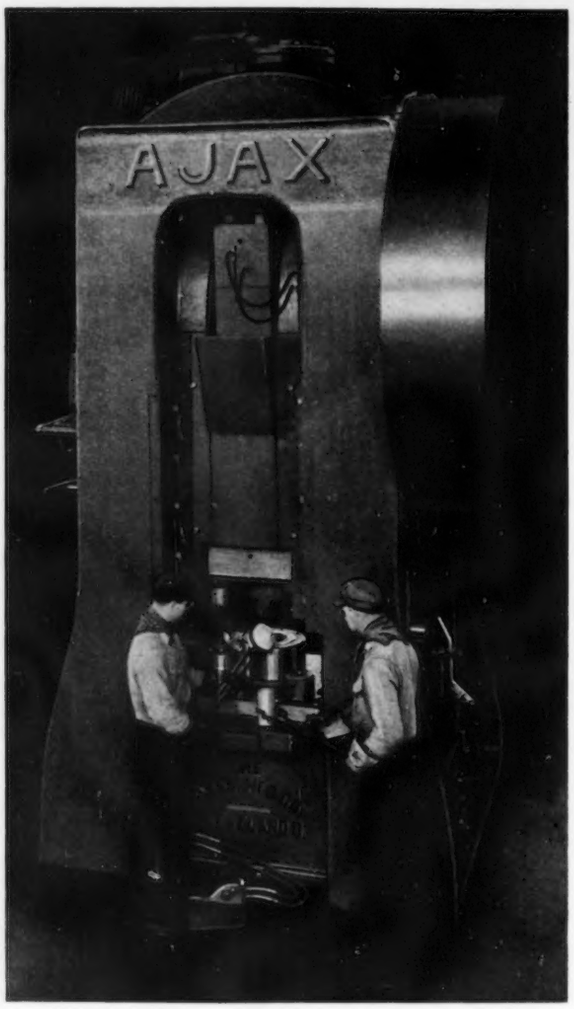
R. G. CAULLEY, J. F. WHITE and C. A. POXSON have been appointed assitant district sales managers in the Republic Steel Corp. Detroit office, which is headed by A. SCHAEFFER.

Mr. Caulley entered the steel business in 1916 with Whitaker-Glessner Co. From there he went to Wheeling Steel Corp. in Portsmouth and in 1926 was transferred to Wheeling's Detroit sales department. He joined Republic's Detroit district sales office in 1934.

Mr. White started his business career in 1910 with the purchasing department of the Chalmers Motor Co., where he remained until 1912, when he was made purchasing agent of the Metal Products Co., in Detroit. In 1918 he became a salesman for United Alloy Steel Co. in the Detroit district, which position he held until 1926 when he went with the Interstate Iron & Steel Co. in the Detroit district in a similar capacity. He remained in the Detroit office after Interstate merged with Republic.

Mr. Poxson was identified from 1915 to 1922 with the purchasing department of the Ford Motor Co. In 1922 he joined the Newton Steel Co. in a sales capacity in Detroit, and in 1927 was made district sales manager. In 1936 he became associated with the

Operating Speeds DOUBLED with AJAX *Air Clutch* SOLID FRAME FORGING PRESSES



★ These New Ajax Forging Presses have twice the speed of the fastest presses of equal tonnage 10 years ago. Their high speeds result in unforeseen advantages and economies which have greatly widened the range of practical press forging.

Deeper die impressions can now be filled sharply and due to the brief period of contact with the hot metal, die life is increased far beyond that obtainable on older presses. Increased output results from the quick clutch response making possible multiple operations without reheats. These factors all lead to a material reduction in production costs.

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND
621 MARQUETTE BLDG., CHICAGO • 201 DEWART BLDG., NEW LONDON

A. H. KOFOED

sales department of Republic in the Detroit district.

❖ ❖ ❖

HARRY S. MATTHEWS, JR., has been appointed assistant general sales manager, Pittsburgh Coal Co., Pittsburgh, succeeding WILLIAM B. POINDEXTER, recently appointed general sales manager.

❖ ❖ ❖

LLOYD E. ARNOLD has been named manager of the Detroit division of P. R. Mallory & Co., Inc., Indianapolis. Mr. Arnold has been with the company for more than two years and during that time has been assistant to JOHN B. TEBBEN, recently appointed sales manager of the metallurgical division. Recently Mr. Arnold, who is a major in the air corps reserve, was elected president of the Michigan Chapter, Air Corps Reserve Officers Association.

❖ ❖ ❖

W. K. HYSLOP has been appointed general manager of the Massey-Harris Co., Racine, Wis. He formerly was European manager of the firm with headquarters at Marquette, France.

❖ ❖ ❖

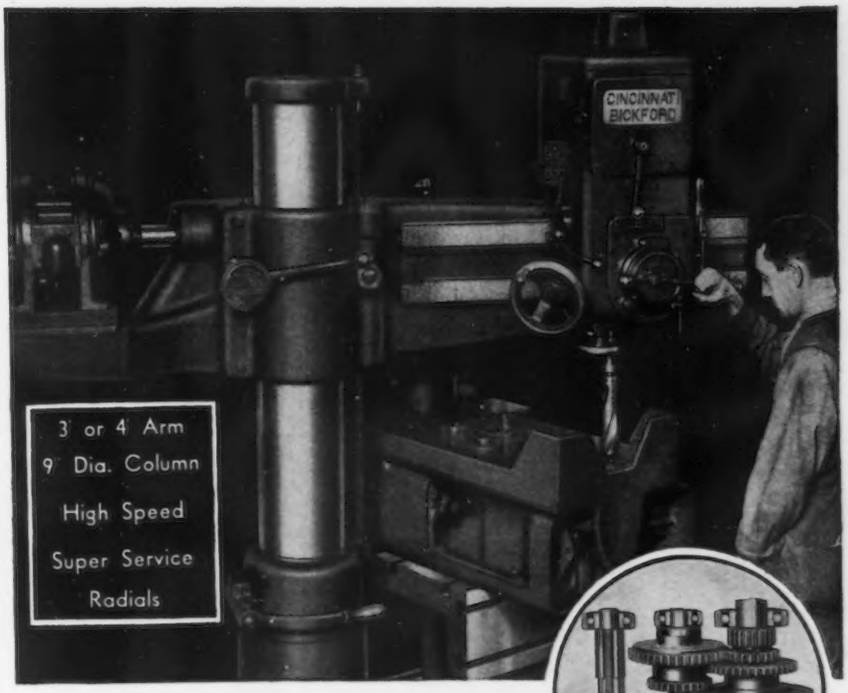
RUSSELL O. HUNT has been appointed assistant superintendent, rolling mill in charge of steel preparation, Duquesne, Pa., works of Carnegie-Illinois Steel Corp. DENNIS A. CROWLEY has been appointed assistant chief metallurgist in charge of inspection and testing, and EDWARD J. CHELIUS has been appointed assistant to superintendent, open hearth department, in charge of electric furnace steel production.

❖ ❖ ❖

M. E. DODGE, formerly a sales engineer with Wilson-Brown, Inc., New York machine tool dealer organization, is now in business for himself, representing Kingsland & Co., Inc., sheet metal tools and equipment makers of Newark, N. J. He will also sell Ohio shear blades, brake dies and machine tools. Mr. Dodge's new address is 136 Liberty Street, New York.

❖ ❖ ❖

HEBER WALLACE PETERS, former vice-president of the Packard Motor Car Co., has been appointed provost of Cornell University. Mr. Peters was graduated from Cornell in 1914 and was secretary of the university for two years. After two years as



9 Spindle Speeds Only 11 Gears

Years of quiet, trouble-free, efficient operation are assured from this radial drill gear train. Nine spindle speeds are obtained with but eleven gears and at each speed there are only two gear contacts. This vital part of the Super Service Radial is noted for its compact simplicity.

Other construction features include—hardened chrome nickel steel gears, multiple splined shafts and anti-friction bearings which are automatically oiled and completely sealed against dirt.

Write for Bulletin R-21A.

SUPER C B SERVICE

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

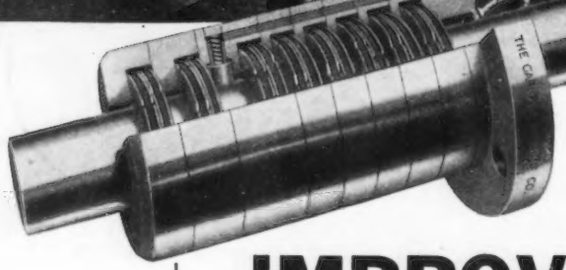
assistant to the president of the Packard Motor Car Co., he served as a combat flyer in the World War. Returning to Packard, he was successively general manager in charge of sales and service in the Detroit branch, general manager of the Chicago branch, and vice-president in charge of sales. From 1934 to 1936 he was assistant general sales manager of the Cadillac Motor Car Co. In his new duties with Cornell, he will serve directly under the president and his chief function will be to coordinate efforts to increase the university's financial resources.

❖ ❖ ❖

E. K. WALDSCHMIDT has been appointed assistant metallurgist, Pittsburgh works, Jones & Laughlin Steel Corp., succeeding A. A. ARCHIBALD, who has been transferred to special metallurgical contact work. He was formerly metallurgical representative in the company's Detroit district and has been connected with the metallurgical department since 1928. He attended Pennsylvania State College and Carnegie Institute of Technology and is a member of the American Society for Metals and the American Welding Society.

❖ ❖ ❖

CHARLES A. CHESTNUT, vice-president of the McCord Radiator & Mfg. Co., has assumed the duties of general manager of the company also. W. W. HARTS, JR., who has been assistant to Mr. Chestnut, will be made assistant treasurer.



GARLOCK 875 Metal Packing is made of improved, non-abrasive iron. Gives long, dependable service on high or low stage gas compressors.

IMPROVED—

For Long Service

The improved iron now used in Garlock Metal Packings has been developed after exhaustive, accelerated-wear tests in one of America's leading universities. In actual service it has conclusively demonstrated its superiority.

Frequent periodic tests guarantee the uniformity of this quality controlled iron. These new, improved Garlock Metal Packings will give remarkably long, economical service.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Limited, Montreal, Que.

GARLOCK

R. J. SCHULER, new assistant manager of sales, bolt and nut division, Republic Steel Corp. Announcement of his appointment was made in these columns last week.

ELMER C. STRIEBEL has been appointed Pittsburgh district sales manager, Pittsburgh Coal Co., Pittsburgh. THOMAS H. QUEER has been appointed sales promotion manager, CHARLES E. MOURER has been appointed sales manager for the Cleveland district, and RAY V. HUNGER has been appointed sales manager for the Buffalo district.

❖ ❖ ❖

A. J. CASTLE, superintendent of cold strip and tin mills of the Inland Steel Co., will speak on "Cold Rolling and Tin Plate Practices," at a meeting at Hotel York, St. Louis, on Dec. 9. He will be assisted by CAPT. L. S. MARSH, manager of the department of metallurgy and inspection for the Inland

J. K. GARRETSON

Steel Co. who will also show motion pictures of these mills in operation.

❖ ❖ ❖

J. K. GARRETSON has been appointed district sales manager for Republic Steel Corp. in its Denver office, succeeding the late Edward C. McSheehy.

Mr. Garretson attended Kenyon College, Gambier, Ohio, and first became associated with the steel industry when he secured work on the open hearth floor of Republic Iron & Steel Co. in Youngstown, prior to the formation of Republic Steel Corp. He was later transferred to the sales department of the Youngstown division and in 1922 went to the Philadelphia district sales office where he stayed for 15 years.

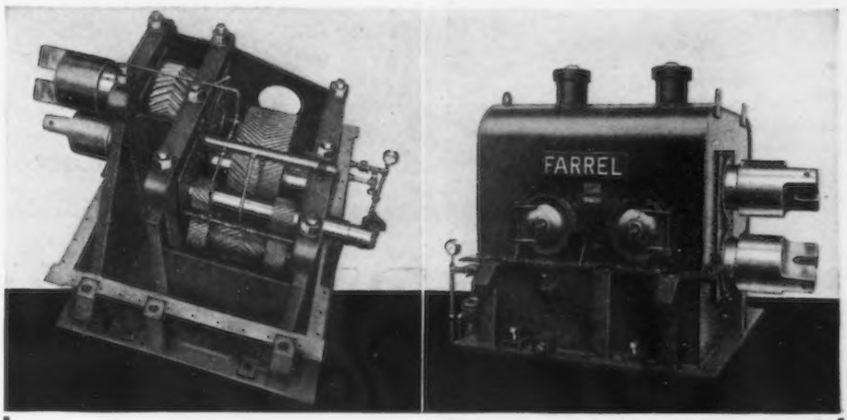
In 1937 he was made resident salesman at Memphis, Tenn., working under the Birmingham district sales office in the states of Mississippi, Arkansas and Tennessee.

HOWARD V. CLARK who, as announced in these columns last week, has been appointed manager of sales, sheet division, Carnegie-Illinois Steel Corp.

K. L. BRENNER, who began railroad service with the Missouri Pacific more than 25 years ago and has been with the Wabash Railway Co. and the Ann Arbor Railroad Co. since 1914, has been appointed purchasing agent, succeeding T. J. FRIER, who has retired because of ill health. Mr. Frier entered railroad service in 1883, has been purchasing agent of the Wabash since 1909.

❖ ❖ ❖

W. W. SEBALD, vice-president and assistant general manager of the



WELDING SOLVES PROBLEMS of DELIVERY and DESIGN

A short delivery was required on six of these drives and no patterns available for the case. The difficulty was overcome by welding the cases of rolled plate, with steel castings for the bearing chocks and caps and foundation bolt columns.

Welding also permitted location of light and heavy sections as required without the limitations that an abrupt change of section imposes on cast structures.

The two views of the drive above illustrate the relatively simple design of the interior for mounting the gears and bearings and the rounded contours possible in a fabricated structure.

Other features of these Drives are the integral pinion unit for direct connection to the mill, the Farrel-Sykes continuous tooth herringbone gears and mill pinions and anti-friction roller bearings. The gears are lubricated by built-in sprays and the bearings are flood lubricated, oil being supplied to both gears and bearings by a central lubricating system. The breathers mounted on the cover prevent oil contamination by trapping dirt and moisture.

Farrel Drives are designed and built "to fit the job." Since we are equipped to make both cast and welded structures, a recommendation of either, or a combination of both, is made in the interest of the customer and is not prejudiced by manufacturing limitations.

FARREL FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

READING
PILES POLES
FOR P. P. AND L.

Pennsylvania Power and Light Co., at Hazleton, Pa., is mighty pleased with their Reading-engineered pole handling set-up. This cab control electric hoist, on monorail and crane, piles poles quickly and efficiently in the company pole yard.

P. P. and L. is one of many satisfied Reading customers. Reading engineers are constantly fashioning cost-cutting production installations in all sorts of industries. They are ready to recommend one to you, if you send in your specifications.

READING CHAIN & BLOCK CORP., Reading, Pa.

READING
CHAIN HOISTS · ELECTRIC HOISTS
TRAVELING CRANES · MONORAIL SYSTEMS

PERFORATED METAL
INDUSTRIAL and ORNAMENTAL
Any Metal • Any Perforation

The uses for perforated metals are numerous and increasing. Industry requires it for a thousand purposes.

For ornamentation it provides beauty of design not otherwise obtainable. We offer a finished product, developed to fully meet the requirements you specify.

The Harrington & King PERFORATING CO.

5657 FILLMORE STREET—CHICAGO, ILL.
New York Office, 114 Liberty Street

American Rolling Mill Co., Middletown, Ohio, has been elected a director of the company, filling the vacancy on the board caused by the death of J. H. Frantz.

❖ ❖ ❖

S. J. MARTIN, formerly superintendent of erection of the piping installation at the new Irvin works of the Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed manager of the engineering department of the Pittsburgh Piping & Equipment Co., Pittsburgh. He was graduated in mechanical engineering from Carnegie Institute of Technology in 1908.

❖ ❖ ❖

R. E. ZIMMERMAN, vice-president, United States Steel Corp., Pittsburgh, has been elected vice-president of the American Standards Association, New York.

❖ ❖ ❖

CHARLES MILLER, for many years identified with the engineering and operating division of Dodge Brothers Co., Detroit, has been appointed branch manager of the Detroit office of the Continental Industrial Engineers, Inc., Chicago. He is a graduate of the University of Michigan.

❖ ❖ ❖

S. M. HENDRICKSON has been made head of the new chemical specialties division of the Zophar Mills, Inc., Brooklyn, N. Y. The new division will handle industrial cleaning and drawing compounds.

❖ ❖ ❖

HARRY GOLDMAN, Riverside Scrap Iron & Metal Co., has been elected president of the Detroit chapter of the Institute of Scrap Iron and Steel, New York. Others elected are MILTON K. MAHLER, Morrow Steel Co., vice-president; GORDON D. SKINNER, Luria Brothers & Co., secretary, and HERBERT W. SMITH, Samuel G. Keywell Co., treasurer.

❖ ❖ ❖

JAMES H. GAMBERTON has been added to the technical staff of Acheson Industries, Inc., New York, and will supervise engineering tests involving new applications of the "dag" products of the company's affiliate, Acheson Colloids Corp. EUGENE F. HEER, formerly associated with du Pont, United States Rubber Co. and Truscon Laboratories, has been placed in charge of sales research activities at Port Huron, succeeding J. H. FULMER, who has resigned. E. R. HAYES, formerly of the Bay State Abrasives Co., has been added to the sales staff to represent the company in Michigan.

CAST IRON PIPE

Hamilton, Mass., has awarded 1000 tons of pipe and fittings to Warren Foundry & Pipe Corp.; J. McDonald Construction Co. contractor.

Montpelier, Vt., will shortly be in the market for a round tonnage of pipe; Baker & Wheeler, 11 Park Place, Albany, N. Y., are engineers.

Stratford, N. H., has awarded 5300 ft. of 10-in. pipe to Warren Foundry & Pipe Corp.; Domenick Zanni, Reading, Mass., is contractor.

Beatrice, Neb., closes bids Dec. 12 for pipe lines for water system and other waterworks installation, including 3,000,000-gal. surface reservoir, extensions in pumping plant, etc. Cost about $136,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Carrollton, Mo., has plans for pipe lines for water system and other waterworks equipment, including elevated steel tank and tower. Fund of $74,000 has been arranged through Federal aid.

Vici, Okla., closes bids Dec. 16 for pipe line extensions in water system, including main trunk lines from new wells for increased supply, pumping machinery and other waterworks equipment. Thomas G. Banks, Liberty National Bank Building, Oklahoma City, is consulting engineer.

Constructing Quartermaster, Carlisle Barracks, Carlisle, Pa., asks bids until Dec. 13 for 1865 ft. of 8-in. and 396 ft. of 6-in., with pipe fittings (Circular 6394-14).

Cornwall-on-Hudson, N. Y., closes bids Dec. 22 for pipe line extensions and replacements in water system. Cost about $44,000. Financing has been arranged through Federal aid. Henry W. Taylor, 9 Park Place, New York, is consulting engineer.

Department of Public Utilities, Jacksonville, Fla., Ernest E. Anders, commissioner, plans pipe line extensions and replacements in water system in different parts of city. Fund of $202,000 has been secured through Federal grant, to be increased by $250,000 through municipal financing, for this and other waterworks installation.

Castle Hill, Iowa, plans about 12,000 ft., various sizes, for water system, including new main line from Cedar Falls. Special election has been called Dec. 19 to approve bond issue for work. R. B. Slippy Engineering Co., Lafayette Building, Waterloo, Iowa, is consulting engineer.

Welcome, Minn., closes bids Dec. 19 for 4800 ft. of 6-in. for water system; also for fittings, fire hydrants, valves, etc. Frank O. Jones, Fairmont, Minn., is consulting engineer.

Laguna Beach, Cal., plans pipe line extensions in water system in Laguna Canyon, Bluebird Canyon and Temple Hill districts; also installation of two booster pumping units and accessory equipment. Cost about $88,700, of which $39,947 will be a Federal grant.

Emory, Tex., plans pipe lines for water system and other waterworks equipment. Fund of $62,000 is being arranged for this and sewage system, of which $35,000 will be a bond issue, recently voted, and remainder secured through Federal aid. A. W. Ashworth, Emory, is engineer.

Ephrata, Pa., closes bids Dec. 19 for extensions in pipe lines for water system. William A. Goff, 220 South Sixteenth Street, Philadelphia, is consulting engineer.

City Council, Pensacola, Fla., has placed an order for 1000 tons of pipe with United States Pipe & Foundry Co., Birmingham, for a waterworks extension project.

Corvallis, Ore., asks bids Dec. 19 on a pipe line requiring 21,000 ft. of 20-in. pipe, and 21,000 ft. of 16-in. pipe (steel alternate).

Dunbar perpetuates the craftsmanship of Springmaking . . . to give you uninterrupted service now and years from now.

Your springquiries get conscientious attention and capable execution

DUNBAR BROS. CO.

DIVISION OF ASSOCIATED SPRING CORPORATION BRISTOL, CONNECTICUT

NF

GOOD FORGINGS *begin here!*

All N.F.O. FORGINGS are manufactured from our own fine quality Basic Electric Steel. Every step in the process is rigidly controlled and supervised.

BASIC ELECTRIC STEEL

Carbon, Alloy, Corrosion Resistant and Special Steels, Smooth Forged, Hollow Bored, Rough or Finished Machined, Heat Treated to specifications. Forging Quality Ingots, Pressed or Hammered Billets.

NATIONAL FORGE AND ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA., U. S. A.

Paris, Idaho, asks bids Dec. 9 on water system improvements involving 33,600 ft. of 2 to 10-in. pipe.

Lexington, Ore., asks bids Dec. 16 on waterworks improvements.

Clatsankie, Ore., closes bids Dec. 19 on reservoir, supply line, and distribution mains; estimated cost, $39,343.

Mentor, Ohio, has awarded 700 tons of cast iron pipe for a water distribution system, to J. B. Clow & Sons Co., Cleveland.

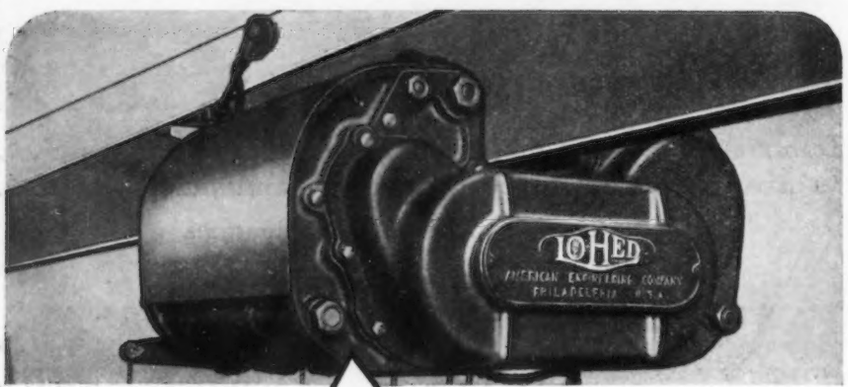
Akron, Ohio, has awarded 825 tons of cast iron pipe to J. B. Clow & Sons Co., Cleveland.

On another project on which bids closed Dec. 1, Shulo Construction Co., Akron, was awarded general contract. This involves 700 tons of cast iron pipe.

West Mansfield, Ohio, has taken bids on a project involving approximately 220 tons of cast iron pipe. H. E. Baker, Wharton, Ohio, is low bidder.

Wooster, Ohio, has taken bids on 300 tons of cast iron pipe for a water distribution system. Sam Triffeletti, Lorain, Ohio, is low bidder.

Amsterdam, Ohio, will take new bids soon on a project involving approximately 250 tons of cast iron pipe.



A High Factor of Safety Here

Assures Safer Handling Here

Specify *THE* hoist with the highest factor of safety!

Let the nearest A-E-CO representative show you why A-E-CO Lo-Hed HOISTS are the safest hoists built.

Ask him to explain Lo-Hed's exclusive features that mean constant, dependable performance and lower maintenance cost.

Let him show you Lo-Hed's uses in scores of industries.

Find out *why* Lo-Hed is the logical hoist for EVERY purpose and why it is the *only* hoist for low headroom conditions. A-E CO Lo-Hed HOISTS are built in many standard models, from ¼ to 12 ton capacities.

Classified phone directories list the local A-E-CO representative in principal cities. Call him in... or write us for the new hoist catalog.

Other A-E-CO Products: Taylor Stoker Units, Marine Deck Auxiliaries, Hele-Shaw Fluid Power.

AECO Lo-Hed HOIST

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE, PHILADELPHIA, PA.

. . . PIPE LINES . . .

Cosden Petroleum Corp., Fort Worth, Tex., has acquired steel pipe line gathering system of Humble Oil & Refining Co., in Howard-Glasscock oil field areas, near Big Spring, Howard County, Tex., and plans new 4-in. welded steel pipe line from that point to connection with present main 8-in. line, which leads to oil refinery of company at Big Spring, for increased crude oil transmission to latter terminus. Humble company will discontinue use of crude oil from Howard Glasscock district and plans early removal of present 8-in. welded steel pipe line from that point to Big Lake oil field, Reagan County, Tex.

Department of Finance and Public Utilities, Alexandria, La., Benjamin F. Bradford, commissioner, plans steel pipe line system for natural gas distribution in Horseshoe Drive district. Financing is being arranged through Federal aid.

United States Engineer Office, New Postoffice Building, Pittsburgh, asks bids until Dec. 17 for new dam and appurtenant structures for Mahoning Dam on Mahoning Creek, including 86,000 lb. of black steel pipe and 32,000 lb. of galvanized steel pipe; also 52,000 lb. of wrought iron pipe and 5200 lb. of cast iron pipe, with 82,000 lb. of iron castings (Circular 292).

North Middletown, Ky., plans steel pipe line from Clintonville to town limits for natural gas transmission for local distribution, connection being made at first noted place with supply source. Fund of $75,000 is being arranged through Federal aid and bond issue for this and improvements in water system.

Iroquois Gas Corp., Iroquois Building, Buffalo, has applied for permission to export natural gas from districts in New York and Pennsylvania to Canada, making connection with system of Provincial Gas Co., Ltd., of Ontario, for such purpose, latter company to carry out distribution in Canadian areas.

Metropolitan Water District of Southern California, 306 West Third Street, Los Angeles, F. E. Weymouth, chief engineer, asks bids until Dec. 12 for pipe lines and appurtenant works for Long Beach, Torrance and Compton laterals of Colorado River Aqueduct distribution system, with alternate bids as follows: (P) Lock-joint steel cylinder reinforced precast concrete pipe—4.7 miles of 36-in., 1.2 miles of 30-in., and 1.3 miles of 21-in.; and (SC) welded steel pipe with Gunite exterior coating and centrifugally applied (spun) mortar lining—4.7 miles of 37-in., 1.2 miles of 31-in., and 1.3 miles of 22-in. (Specifications 293).

Cutting Costs of Cutting Oils

(CONCLUDED FROM PAGE 51)

water, the mixer started up and the soluble oil let into the tank out of a measuring tank. When all of the oil has been added, the balance of the water is let into the tank.

The viscosity of the oil and the ratio of the oil to water are determined by the purpose for which the coolant is to be used. Generally a paraffine oil with a viscosity of 100 S.S.U. at 100 deg. F. is used, but for very heavy work, viscosities up to 300 are used. The ratio of oil to water varies from one part of oil to 10 parts of water, to one part of oil to 75 parts of water.

Colorado Fuel, Other Companies Protest Steel Wage Rates

WASHINGTON. — Protests in increasing number against its recommendations for common labor minimum iron and steel wage rates of 62½c. in the North and 45c. in the South are being filed with the Public Contracts Board as the deadline of Dec. 10 approaches.

The Sloss-Sheffield Steel & Iron Co., and the Woodward Iron Co., in the Birmingham district, want merchant blast furnaces removed from the classification set up for the steel industry or to be granted exemption in order that the rate of 40c. can be maintained.

The Colorado Fuel & Iron Corp., Pueblo, Colo., declared that its present common labor rate of 60c. an hr., which would be increased to 62½c. under the board recommendations, is generous and that to increase the rate will work not only to the disadvantage of the employer, but to the manifest disadvantage of its employees. It was protested that the rate of 45c. suggested for the South and the 62½c. rate for the Colorado plant is so wide a spread as to give unjustified advantages to steel makers in the Birmingham area. It was also protested that lifting of the rate on the Colorado company was to its disadvantage in competition with plants in the Middle West and along the Atlantic seaboard.

May Drop Insurance

Bringing in a new phase of the situation the company mentioned regulations of July 6, 1937, by the Secretary of Labor saying that the Walsh-Healey Act prohibits tax deductions for community chest contributions, group insurance premiums, and medical expenses. It was suggested that this regulation is not consistent with nor supported by the provisions of the act. The company said that at the urgent request of its employees, arrangements had been made with one of the leading life insurance companies to write group insurance on the employees.

It was declared, however, if the wage rate be fixed, in the light of the regulation, the company will be required to either discontinue the arrangement or the employer will be compelled to pay the determined wage rate plus the employees' proportion of the group insurance, that is, the employer would have to pay more than the minimum determined wage. Also, it was said that, in the light of the regulation, the employer can no longer deduct $1.50 per month from employees at the steel plant for complete hospitalization. The company, therefore, it was stated, would have to pay the minimum wage plus the medical fee, and says it is not able to afford the added expense.

The company said that if conditions justify differentials between the Birmingham area and steel producing districts in the Northern states other conditions likewise justify a differential between the Colorado plant and mills in other Northern states. In this connection it was said competing steel plants are so situated to ship at land grant rates while the Colorado plant is not so situated.

Reeves Files Appeal

Further study of the position of the smaller companies in the competition

It Pays to check with
Roots
CONNERSVILLE
when you need
AIR or GAS
handling equipment
Plainly written in dollars and cents on the cost records of operating companies from coast to coast are the simple facts upon which is based the preference for Roots-Connersville equipment. Low operating and maintenance costs in "R-C" blowers or exhausters for your furnaces, smelters, cupolas, converters, agitators, acid plants, coke ovens, etc., are the studied results of many years association with air and gas handling problems. Recommendations on any equipment manufactured by us will be gladly given without obligation.
since
1854
ROOTS-CONNERSVILLE BLOWER CORP.
CONNERSVILLE, INDIANA

for Government business was asked by the Reeves Steel & Mfg. Co., Dover, Ohio, manufacturer of steel sheets and sheet metal products, which has a minimum common labor rate of 53½c. an hour. The company said that the small manufacturers are fighting for their very existence and that if the recommended rate of 62½c. is adopted it will be another blow to their hopes of continuing in business. The company said it is not possible to pay more than it now pays labor and survive.

"We can't believe it is the intention of the Administration to legislate the small manufacturer out of business, but if they are forced to pay same labor rates as are paid by their large competitors (who control all operations from ore to the finished product), they have no chance to participate in Government orders, except at a loss," the statement said.

The Sloss-Sheffield and Woodward companies protested the inclusion of commercial pig iron as a part of the steel industry, pointing out that the steel industry produces for its own uses basic iron, with only a negligible output of commercial iron in the Birmingham district as compared with its total business.

The Public Contracts Board was asked to eliminate the commercial pig iron business in the Birmingham district from classification with the steel business and find the prevailing minimum wage in that locality in the commercial pig iron business to be 40c. an hr. or to fix a rate in the industry as defined by the board at 40c., not 45c., or to grant exemption to merchant pig iron makers in the Birmingham district by making the 40c. rate applicable to such products.

The brief challenges the reasoning of the board with respect to the finding that the largest concentration of workers at 45c. an hr. is in the Birmingham area where seven plants employing 7631 employees with 988 at the base rate are located. The brief points out that the seven plants are operated by only one concern, the Tennessee Coal, Iron & Railroad Co., and that they are engaged primarily in production of steel, making principally basic and not commercial pig iron.

It is declared that in view of the long established practice as to minimum wage rates in the commercial pig iron business in the Birmingham district and the long recognized differential in the United States Steel Corp., operations in that district, the least that should be done is special treatment with respect to commercial pig iron makers pursuant to Sec. 6 (exemption section) of the Walsh-Healey Act.

President Thomas N. Dysart of the St. Louis Chamber of Commerce said the proposal to divide the country into two districts, a Northern district with a minimum of 62½c. an hr., in which the St. Louis producing area is included, and a Southern district, with a minimum of 45c. an hr., is highly discriminatory and injurious to the St. Louis producing area and completely ignores prevailing minimum wage scales in the industry in that locality, which, under existing labor contracts, range from 55c. to 58½c. an hr.

Stanley Works Protests

President C. F. Bennett of the Stanley Works, New Britain, Conn., protested the application of minimum rate of 62½c. to a New England maker of steel. It was declared that a study of rates makes it quite evident that a separate rate for the Eastern district is justified. The greatest concentration of workers, he said, is at the rate of 56½c. per hr.

"We contend," he said, "that, instead of being a benefit to common labor in this district by raising wages, the recommendation of your board will be a detriment to labor by loss of business and opportunity to work. It will be more difficult, if not impossible, to compete for Government business."

Television in Infancy G-E Expert Declares

TWO technical problems confronting television are distance or range and costs of "piping" programs from city to city, according to Dr. W. R. G. Baker, chairman of General Electric Co.'s management committee of the radio and television research. Television, Dr. Baker recently told G-E field men, is "still a laboratory product requiring skilled engineers for its operation."

Granite City Increases Flat-Rolled Capacity

GRANITE CITY STEEL CO. is to erect a second cold strip steel mill and a new unit for temper rolling at its plant at Granite City, Ill., it was announced by Hayward Niedringhaus, president. The company also will double the capacity of its coil annealing equipment by the addition of new machinery.

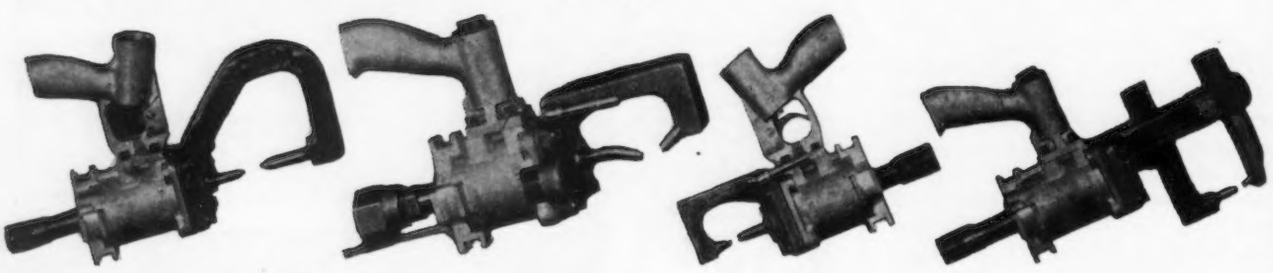
These improvements are a part of program, begun in 1935, in which more than $5,000,000 will be spent, Mr. Niedringhaus said.

The new annealing and temper rolling unit will permit the company to supply sheet steel of any marketable gage, he said. The company also will be able to produce a wider range of tin plate and other similar products.

It is expected that the improvements will be completed about March 1.

GUN WELDERS

SWIFT ELECTRIC WELDER CO., 6560 Epworth Blvd., Detroit, Mich., Welding machines hand, hydraulic, cam or air operated of the following types: spot, seam, projection, flash, flue & pipe.



. GREAT BRITAIN .

. . . Buying awaits announcement of 1939 prices.

LONDON, Dec. 5.—Impatience is growing at delay in publication of British 1939 iron and steel prices. Practically all first quarter pig iron heavy steel business is suspended. There is fair inquiry but producers are unwilling to tender. Substantial export orders are reported to be pending. A reduction, as from Jan. 1, of £2 in the home price of ferromanganese is regarded as an encouraging sign for a fair cut in iron and steel prices.

Continental steel demand is still poor and there is no real revival now envisaged before January as the holiday season and end of the year approach. The fall in the pound may result in the cartel increasing conversion rates, which prospect has resulted in a certain amount of speculative buying.

Tin plate business is disappointing. There is some buying up to the end of March, but unfilled orders amount to only 2,250,000 base boxes. Recent export bookings are one-third of total. The usual Canadian order has not yet been placed here.

Black and galvanized sheets are idle. Galvanized sheet mills are badly in need of orders.

Andrews Ruling Broadens Scope Of Wage-Hour Law

WASHINGTON. — Further broadening the scope of the wage-hour law, Administrator Elmer F. Andrews has issued an interpretative bulletin in which it is held that employees are covered by the law where the employer intends or hopes or has reason to believe that the goods or any unsegregated part of them will move in interstate commerce and that the act makes no distinction as to the percentage of an employer's goods which moves in interstate commerce.

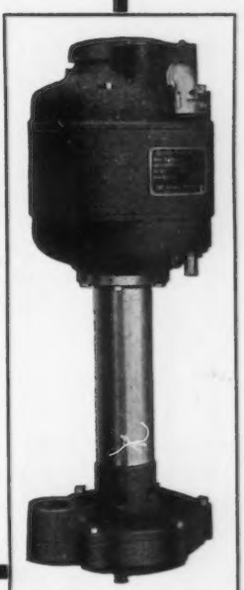
The ruling is qualified with the warning that interpretations made by the Administrator, except where he is expressly authorized to issue such clarifications, are for the purpose of guiding in the administration of the law and may be changed by subsequent court rulings or by the Administrator himself if he determines that the previous interpretation is incorrect.

As a sign post for those confused by the law, the Administrator points out that the facts at the time goods are produced determines whether an employee is engaged in the production of goods for commerce rather than any subsequent act of his employer or of some third party. Under the Administrator's latest interpretative bulletin, the following employees have been ruled as coming under the provisions of the law: (1) Employees engaged in repairing, maintaining or reconstructing railroads, ships, highways, bridges, pipe lines or other interstate facilities; (2) employees of wholesalers who purchase their goods outside the state even though their sales are made within the state; and (3) employees of printing establishments, trade associations, research and compilation services disseminating information in interstate commerce.

From a TRICKLE to a GUSHER

Today's rigid production methods require a Coolant pump that needs no packing nor priming at any time—a Coolant pump that will not break down, or hold up production. One that will deliver a constant flow of coolant either in a trickle or gusher. Ruthman's "Gusher" Coolant Pumps meet these requirements thoroughly. Better investigate today.

THE RUTHMAN MACHINERY COMPANY
537 EAST FRONT ST., CINCINNATI, OHIO



Model "TL" Gusher Pump with Polyphase Motor.

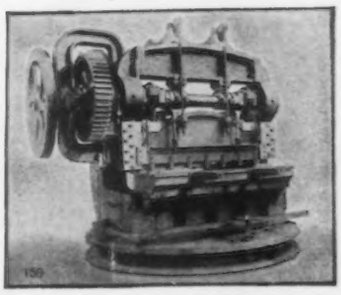
PRESSES • DIES • METAL-FORMING MACHINERY

FABRICATING MACHINERY

PUNCHES • SHEARS • SPACING TABLES

Plate Shears—for Steel Plants

• Leading steel plants all over the country use Thomas Plate Shears, appreciating that they DO stand up under toughest use day in and day out! The complete line of Thomas shears is sure to meet your every need. Write for information.



THOMAS
MACHINE MANUFACTURING COMPANY
Name changed from Thomas Spacing Machine Co.
PITTSBURGH, PA.

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

November Daily Pig Iron Output Up 14.3 Per Cent

PRODUCTION of coke pig iron in November on a daily basis increased 14.3 per cent over that in October, or from 66,203 gross tons a day to 75,666 tons. Output for the month totaled 2,269,983 tons compared with 2,052,284 tons in October.

There were 121 furnaces in blast on Dec. 1, operating at the rate of 75,795 tons a day, compared with 115 furnaces on Nov. 1, producing at the rate of 70,690 tons daily. Eight furnaces were put in operation during the month and two were taken off blast. U. S. Steel blew in two furnaces, independents blew in five and took one off blast and merchant producers blew one in and took one unit out of production.

Among the furnaces blown in were the following: One Carrie and one Gary, Carnegie-Illinois Steel Corp.; one Cambria and one Sparrows Point, Bethlehem Steel Co.; one Campbell, Youngstown Sheet & Tube Co.; one River and one Betty, Republic Steel Corp., and one Niagara, Tonawanda Iron Corp.

The two furnaces blown out or banked included the Troy Furnace Corp. unit, and one Bethlehem furnace of the Bethlehem Steel Co.

The number of available furnaces making pig iron has been decreased from 239 to 238 by the dismantling of the Keystone furnace at Reading, Pa., of the Reading Iron Co.

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1938	1937	1938	1937
January	1,429,085	3,211,500	22,388	23,060
February	1,298,268	2,999,218	20,205	24,228
March	1,452,487	3,459,473	21,194	27,757
April	1,376,141	3,391,665	18,607	26,765
May	1,255,024	3,537,231	13,341	34,632
June	1,062,021	3,107,506	14,546	34,415
½ year	7,873,026	19,706,593	110,281	170,857
July	1,201,785	3,498,858	20,818	23,913
August	1,493,995	3,605,818	6,088	29,596
September	1,680,435	3,410,371	630	26,100
October	2,052,284	2,892,629	3,621	26,348
November	2,269,983	2,006,724	13,156	25,473
December	.....	1,490,324	....	22,674
Year	.....	36,611,317	....	324,961

*These totals do not include charcoal pig iron.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

Tons

	1938	1937	1936	1935	1934
January	10,635	16,106	10,537	3,926	7,800
February	8,854	16,514	11,296	6,288	7,071
March	8,524	16,457	10,831	7,089	7,197
April	8,273	14,517	13,897	8,799	8,838
May	6,431	19,483	12,814	8,441	9,099
June	5,375	15,870	14,209	7,874	9,499
July	5,495	19,609	11,619	8,644	7,880
August	6,614	17,831	12,148	8,194	6,043
September	11,205	20,065	12,526	10,090	4,986
October	10,799	18,950	13,645	11,199	5,765
November	13,208	15,662	14,739	12,503	6,610
December	....	10,964	14,852	13,312	4,399

Daily Average Production of Coke Pig Iron

Gross Tons

	1938	1937	1936	1935	1934
January	46,100	103,597	65,351	47,656	39,201
February	46,367	107,115	62,886	57,448	45,131
March	46,854	111,596	65,816	57,098	52,243
April	45,871	113,055	80,125	55,449	57,561
May	40,485	114,104	85,432	55,713	65,900
June	35,400	103,584	86,208	51,570	64,338
½ year	43,497	108,876	74,331	54,138	54,134
July	38,767	112,866	83,686	49,041	39,510
August	48,193	116,317	87,475	56,816	34,012
September	56,015	113,679	91,010	59,216	29,935
October	66,203	93,311	96,512	63,820	30,679
November	75,666	66,891	98,246	68,864	31,898
December	....	48,075	100,485	67,950	33,149
Year	....	100,305	83,658	67,556	43,592

Production by Districts and Coke Furnaces in Blast

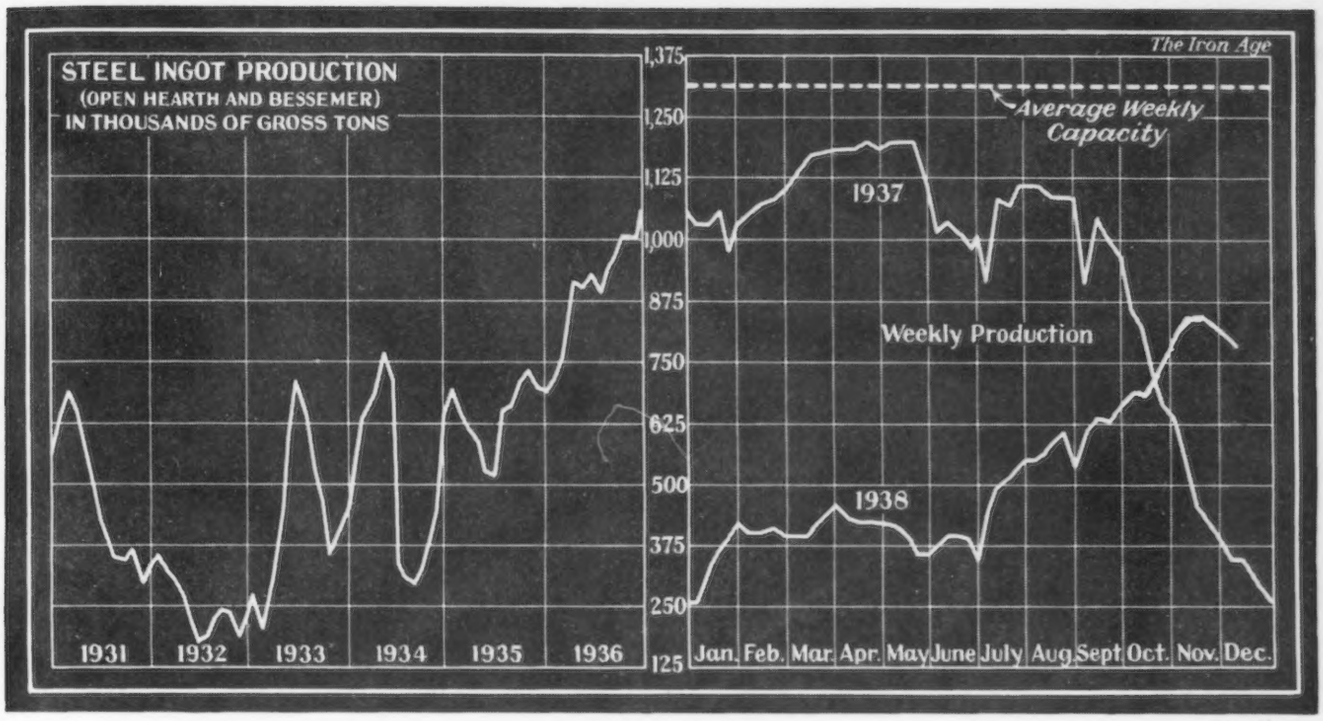
FURNACES	Production (Gross Tons) November (30 Days)	Production (Gross Tons) October (31 Days)	December 1 Number in Blast	December 1 Operating Rate, Tons a Day	November 1 Number in Blast	November 1 Operating Rate, Tons a Day
New York:						
Buffalo	140,854	136,194	8	4,830	7	4,530
Other New York and Mass.	14,232	23,774	1	225	2	805
Pennsylvania:						
Lehigh Valley	53,274	49,212	3	1,220	4	1,585
Schuylkill Valley	15,824	15,525	1	530	1	555
Susquehanna and Lebanon Valleys	14,076	15,507	1	470	1	500
Pittsburgh District	386,293	356,112	18	13,080	17	12,050
Ferro. and Spiegel	5,740	700	1	190	1	25
Shenango Valley	34,277	36,788	2	1,145	2	1,185
Western Pennsylvania	39,947	49,200	3	1,330	3	1,585
Ferro. and Spiegel	4,584	....	1	155	0	....
Maryland	134,492	122,354	5	4,485	4	3,945
Wheeling District	125,109	111,692	6	4,170	6	3,605
Ohio:						
Mahoning Valley	263,105	219,902	12	9,020	11	8,300
Central and Northern	217,677	176,531	12	7,590	10	6,960
Southern	36,179	34,406	4	1,205	4	1,110
Illinois and Indiana	429,748	367,118	18	14,325	17	12,945
Michigan and Minnesota	86,964	72,547	5	2,900	5	2,850
Colorado, Missouri and Utah	20,775	20,355	2	695	2	655
Ferromanganese	....	....	0	....	0	....
The South:						
Virginia	....	....	0	....	0	....
Ferromanganese	2,832	2,921	1	95	1	95
Kentucky	9,701	10,327	1	325	1	335
Alabama	234,300	231,119	16	7,810	16	7,970
Tennessee	....	....	0	....	0	....
Total	2,269,983	2,052,284	121	75,795	115	70,690

Toledo Company Plans Duralumin Airplanes

THE Lenert-Wauseon Aircraft Co. of Toledo, Ohio, is being reorganized with capital supplied by Toledoans. It is reported that the owner of a Toledo factory is donating use of plant facilities for a year so the reorganized company can begin construction of a training type airplane to be constructed entirely of duralumin. It is planned eventually to build a plant near the Toledo airport. Among executives of the company are: William Lenert, president; Frank Hoffman, secretary-treasurer, and Dr. L. E. Hackbarth, vice-president.

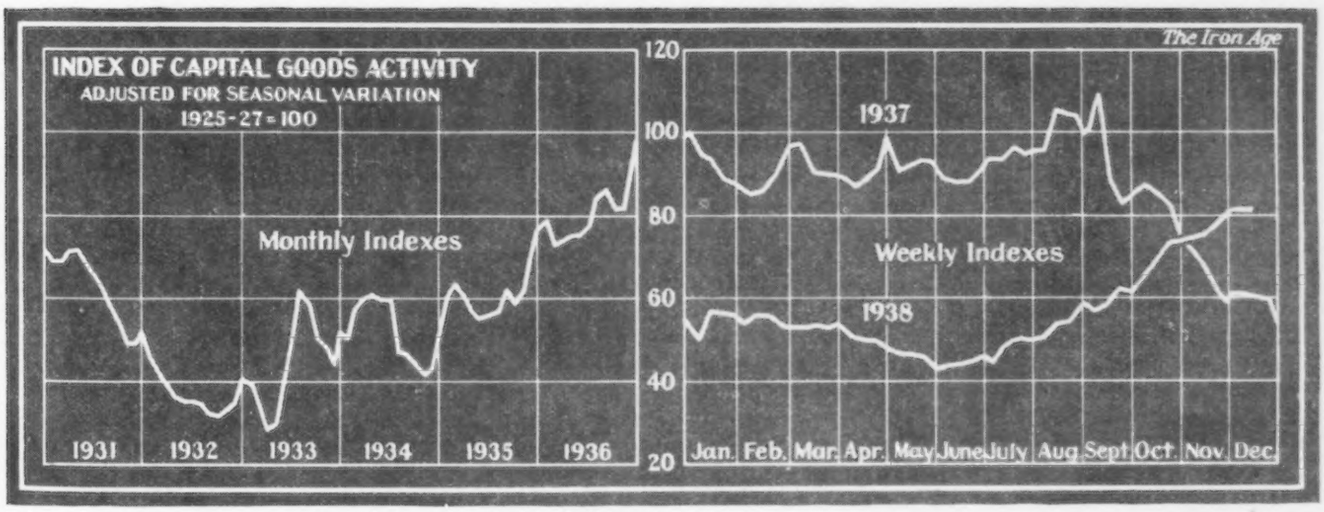
The Allen-Bradley Co., Milwaukee, Wis., has appointed the Industrial Machinery Co., 3008 First Ave., N., Great Falls, Mont., to handle the Allen-Bradley line of motor control equipment in the Montana and northern Idaho territories. Mr. West L. Powell is in charge. Allen-Bradley also announces the appointment of Mr. Paul R. Urich, 1045 West 26th St., Erie, Pa., as its representative in the Erie territory.

Ingot Output Down One-Half Point to 60 Per Cent



		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Wheel-ing	Buffalo	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
District Ingot Production, Per Cent of Capacity	CURRENT WEEK..	43.0	59.5	65.0	37.0	64.0	79.0	48.5	87.5	60.0	66.0	40.0	59.0	95.0	**60.0**
	PREVIOUS WEEK..	47.0	56.5	63.0	37.0	68.0	81.0	52.5	87.5	60.0	64.0	40.0	59.0	75.0	**60.5**

Capital Goods Output in November Highest in 13 Months



THE rate of activity in the nation's heavy industries in November was at the highest level reached in 13 months, according to THE IRON AGE monthly index of capital goods activity. The November index, at 77.5, is 11 per cent above the October level and 19 per cent above the November, 1937, figure. Most noteworthy development of the month was the sharp improvement in steel making operations, as indicated by the advance of weighted index of this component to 95 at the end of November from 75.3 at the close of October. Following the steel series, in the order of the magnitude of the month's improvement were the Pittsburgh, automobile, construction and lumber series. The weekly index for the week ended Dec. 3 is unchanged from the previous week at 80.4.

	Week Ended Dec. 3	Week Ended Nov. 26	Comparable Week 1937	Comparable Week 1929
Steel ingot production[1]	92.8	95.0	44.2	95.8
Automobile production[2]	94.4	96.9	82.3	68.7
Construction contracts[3]	82.9	80.4	59.4	120.1
Forest products carloadings[4].	60.1	57.5	58.9	105.6
Production and shipments, Pittsburgh District[5]	71.9	72.5	59.9	106.8
Combined index	**80.4**	**80.4**	**60.9**	**99.4**

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. *Engineering News-Record*; 4. Association of American Railroads; 5. University of Pittsburgh.

. . . SUMMARY OF THE WEEK . . .

. . . First quarter prospects improving; current buying cautious.

° ° °

. . . Steel prices reaffirmed for the first quarter.

° ° °

. . . Pig iron output up 14.3 per cent; construction awards heavy.

YEAR-END caution in steel buying does not obscure an improved outlook for business in the first quarter. The falling off in orders this month is not drastic, and operations may not decline much. Meanwhile, prospects that will build up mill tonnage early next year continue to accumulate.

Enlarged buying programs in railroad material and equipment, construction steel, tin plate, automotive requirements and miscellaneous business are definitely in sight.

Railroad requirements, though below normal, are building up. About 50,000 tons of steel will be needed for freight cars now pending, including 2100 for the Norfolk & Western, a new inquiry for 1000 gondola cars from the Illinois Central and 400 for the Wheeling & Lake Erie. Rail inquiries, which may appear in larger volume next month, include 25,000 tons for the Chesapeake & Ohio, 13,000 tons for the Norfolk & Western and 5000 tons for the Nickel Plate.

Construction steel awards are heavier, totaling nearly 41,000 tons of fabricated structural material, more than 11,000 tons of reinforcing bars and 9200 tons of plates. New structural steel projects for which inquiries have been issued total upward of 43,000 tons, while 16,800 tons is pending in new reinforcing bar projects.

Automobile companies may make new purchases before the end of the month. Last week's assemblies probably would have totaled 100,000 or more had it not been for strikes.

Tin plate purchases are expected to develop in large volume shortly after the first of the year, present operations being about 30 to 35 per cent.

THIS week's ingot production is estimated at 60 per cent, down a half point from last week. While there have been declines in the Pittsburgh, Cleveland-Lorain, Wheeling-Weirton and Buffalo districts, operations are higher at Chicago, Youngstown and in southern Ohio. Elsewhere they are holding even with last week.

November output of ingots, at 3,572,220 gross tons, representing an average rate of 62.05 per cent, was the largest since September, 1937, and was about 14.6 per cent over that of October.

Pig iron production last month gained 14.3 per cent. The month's total was 2,269,983 gross tons compared with 2,052,284 tons in October. On a daily basis the comparison is 75,666 tons against 66,203 in October. There were 121 furnaces in blast on Dec. 1, a gain of six during the month. The dismantling of the Keystone furnace at Reading, Pa., reduces the number of available furnaces to 238.

THE reaffirmation of steel prices for the first quarter by leading steel companies was generally expected by the trade, although under similar conditions in the past a price advance probably would have been attempted. The only important price change is on black plate, recently quoted at a base price of 3.15c. a lb., Pittsburgh, which has been reduced to 3.05c., for 29 gage and lighter. New extras, effective Dec. 1, are being published. Although wire prices have been reaffirmed for the first quarter, no action has been taken on merchant wire products, which, because of persistent price irregularities, probably will remain on a spot basis for the present. Revision of extras on nails may be delayed until orders and prices are firmer. Several bolt and nut producers have temporarily withdrawn prices on all headed and threaded items with the explanation that quotations are below manufacturing costs. New prices on a higher level will be out soon.

Pig iron prices probably will be reaffirmed this week. The only action announced is by Lake Superior charcoal iron makers, who will continue present prices through the next quarter. Prices on ferroalloys other than ferromanganese have been reaffirmed.

Reflecting the year-end business lull, scrap prices have declined 50c. a ton at Chicago, though steel production there is higher than last week, while at Pittsburgh and in the East quotations are steady. THE IRON AGE scrap composite price is 17c. lower at $14.75, a decline of 25c. from the November peak.

With the Lake Superior ore carrying season at an end, the 1938 movement was 19,263,011 gross tons, lowest since 1932.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Dec. 6, 1938	Nov. 29, 1938	Nov. 9, 1938	Dec. 7, *1937
Rails, heavy, at mill	$40.00	$40.00	$40.00	$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.15	2.15	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.20	3.20	3.20	...

Cents Per Lb.:	Dec. 6, 1938	Nov. 29, 1938	Nov. 9, 1938	Dec. 7, *1937
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.45	2.45	2.45	2.75
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.90
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.20	3.20	3.20	3.40
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.35	$5.35

*Pittsburgh prices only.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$22.84	$22.84	$22.84	$25.76
No. 2, Valley furnace	21.00	21.00	21.00	24.00
No. 2, Southern Cin'ti	21.06	21.06	21.06	23.89
No. 2, Birmingham	17.38	17.38	17.38	20.38
No. 2, foundry, Chicago†	21.00	21.00	21.00	24.00
Basic, del'd eastern Pa.	22.34	22.34	22.34	25.26
Basic, Valley furnace	20.50	20.50	20.50	23.50
Malleable, Chicago†	21.00	21.00	21.00	24.00
Malleable, Valley	21.00	21.00	21.00	24.00
L. S. charcoal, Chicago	28.34	28.34	28.34	30.24
Ferromanganese, seab'd carlots	92.50	92.50	92.50	102.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$15.75	$15.75	$15.00	$13.25
Heavy melting steel, Phila	14.75	14.75	14.75	14.25
Heavy melting steel, Ch'go	*13.75*	14.25	13.75	11.75
Carwheels, Chicago	*12.50*	12.75	13.00	14.50
Carwheels, Philadelphia	16.75	16.75	16.75	16.25
No. 1 cast, Pittsburgh	15.50	15.50	15.50	16.25
No. 1 cast, Philadelphia	16.75	16.75	16.75	16.25
No. 1 cast, Ch'go (net ton)	12.50	12.50	12.75	11.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$4.00
Foundry coke, prompt	4.75	4.75	4.75	5.00

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Electrolytic copper, Conn.	11.25	11.25	11.25	10.50
Lake copper, New York	11.375	11.375	11.375	11.125
Tin (Straits), New York	*46.25*	45.90	46.625	44.50
Zinc, East St. Louis	4.50	4.50	5.05	5.00
Zinc, New York	4.89	4.89	5.44	5.35
Lead, St. Louis	*4.70*	4.85	4.95	4.85
Lead, New York	*4.85*	5.00	5.10	5.10
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	14.50

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
December 6, 1938	2.286 a Lb.	$20.61 a Gross Ton	$14.75 a Gross Ton
One week ago	2.286	20.61	14.92
One month ago	2.286	20.61	14.50
One year ago	2.512c.	23.25	13.08

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1938	2.512c., May 17	2.211c., Oct. 18	$23.25, June 21	$19.61, July 6	$15.00, Nov. 22	$11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 23	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

. . THIS WEEK'S MARKET NEWS . .

STEEL OPERATIONS

. . . Ingot production off slightly to 60% of capacity

ALTHOUGH steel ingot output for the country as a whole, as estimated by THE IRON AGE, is off a half point this week to 60 per cent of capacity, the trend is not generally downward. At CHICAGO increased operations at two plants have boosted the district rate three points to 59½ per cent. There is also an upward trend of two points in YOUNGSTOWN and nearby cities to 65 per cent, and southern Ohio is up two points to 66 per cent.

There are declines in some districts, however. PITTSBURGH output is four points lower at 43 per cent; the WHEELING-WEIRTON area is down two points to 79 per cent; the CLEVELAND-LORAIN district has declined four points to 64 per cent; Buffalo is off four points. Elsewhere operations are unchanged.

No drastic decline is expected this month, though the holiday week will probably show a temporary drop.

The American Iron and Steel Institute on Monday estimated this week's operations at 59.9 per cent.

NEW BUSINESS

. . . Year-end caution marks buying . . . First quarter prospects good

YEAR-END caution governs steel buying in the PITTSBURGH district but total tonnages booked are holding up fairly well. Despite the small individual tonnages involved, diversification appears to be expanding. Conditions seem to be building up to a better buying program for the first and second quarters of 1939, involving railroad material, structural business, tin plate, automotive, and accumulated miscellaneous demand.

With the exception of additional sheet orders from the automobile industry, CHICAGO sellers do not look for much new business until next year. Steel is being ordered now for the Illinois Central second group of 1000 cars, which probably will be the last car order of the year unless the Wheeling & Lake Erie 400 cars are placed soon.

Inquiries already received for bolts, spikes and other track accessories indicate the railroads need for track materials. Some small rail orders may be seen before the month is over. Next year's rail prospects are bright because of the small carryover this year.

CHICAGO foundries melting for farm equipment plants are busier. Some galvanized sheets have been ordered for combines and threshers. Bolt and nut bookings in one CHICAGO office last week were the best of the year.

The steel awards for the first section of the Chicago subway are expected early next week.

Incoming orders have been only modest recently at CLEVELAND and YOUNGSTOWN. Consumers are reluctant to add to their inventories until January at least, and probably will continue on a hand-to-mouth basis until the business situation or other events make buying necessary and advantageous. There have been a few instances, however, of consumers reordering after exhausting the stocks purchased in October.

Production of automobiles from now on will be more closely alined to actual car sales, which if good in the next few weeks may result in the buying of automotive steel toward the latter part of December or early January.

The largest group of construction awards since the spring of 1937 is reported from the Pacific Coast.

Rail inquiries are beginning to appear. The Chesapeake & Ohio has come out for 25,000 tons, the Norfolk & Western for 15,000 tons, and the Nickel Plate will buy 5000 tons. The Illinois Central has inquired for an additional lot of 1000 freight cars.

The International Harvester Co. has announced an extensive program of replacement of machine tools to be undertaken in 1939 for its motor truck, tractor and some implement plants.

PIG IRON

. . . Prices probably will be reaffirmed for first quarter

ALTHOUGH no announcements by pig iron makers regarding first quarter prices had been made at press time, it was reported in the trade that undoubtedly present prices will be continued through the first three months of the new year.

Makers of ferroalloys, other than ferromanganese, have reaffirmed present prices for the first quarter, and it is expected that an announcement on ferromanganese will be forthcoming shortly.

Lake Superior charcoal pig iron prices have been reaffirmed for the first quarter.

In most centers shipments are at a fairly steady rate, but new buying is extremely light. November shipments of CLEVELAND and YOUNGSTOWN producers ran from 10 to 17 per cent above those of October. Large water shipments and the requirements of special consumers, such as the automobile industry, aided shipments in the Great Lakes area.

Furnaces have some business on their books which was taken prior to the fourth quarter advance of $1 a ton, and there is some doubt as to whether all of this will be shipped by the end of this month.

A rather vague export inquiry for shipment of 150,000 tons of pig iron to Antwerp has been floating around the New York market. There is some doubt as to the validity of the inquiry, as it is regarded as highly unlikely that any European country would be interested in buying that much iron here under present world conditions. A Japanese inquiry for 30,000 tons, which has been pending for some time, has been booked by Australian furnaces, whose prices, as well as those of Indian producers, were lower than American quotations.

PRICES

. . . Quotations on steel products reaffirmed for first quarter

ON Dec. 1 the Carnegie-Illinois Steel Corp. issued the following announcement:

"The Carnegie-Illinois Steel Corp. announced today reaffirmation of present prices of all products for shipment during the first quarter of 1939 for delivery and consumption in the United States."

On Dec. 2 the American Steel & Wire Co. issued this announcement:

"American Steel & Wire Co. reaffirms current base prices on rods, wire and cold rolled strip for delivery during the first quarter of 1939."

Other companies have either made similar announcements or will probably do so this week.

It will be noted that the announce-

ment of the American Steel & Wire Co. made no reference to merchant wire products. Owing to the price irregularities that have existed in these products, it is possible that the market may be permitted to remain on a spot basis. Contrary to expectations, no announcement has been made officially as to new extras on nails.

The base price and extras on black plate, 29 gage and lighter, have been revised to correspond with recent changes in coated stock quotations. The new base price is 3.05c. a lb., Pittsburgh, against a former base of 3.15c.

Several bolt and nut producers have temporarily withdrawn prices on all headed and threaded items with the explanation that present prices are below manufacturing costs and with the assurance that new prices will be sent out within a few days. Rivet prices have been reaffirmed for the first quarter of 1939.

Although no announcement has been made on pig iron prices, it is expected that present prices will be reaffirmed, probably this week. Prices on ferroalloys other than ferromanganese have been reaffirmed for the next quarter. An announcement on ferromanganese is expected shortly.

SEMI-FINISHED STEEL

. . . *Sheet bar shipments are fairly good*

MOVEMENT of sheet bars to non-integrated mills continues fairly heavy. Current miscellaneous business at PITTSBURGH however has receded due to seasonal conditions. Prospects for first quarter appear fair but with reaffirmation of prices no forward buying is looked for.

STRUCTURAL STEEL

. . . *New York, Tacoma bridges led sharp upswing in awards*

AWARDS this past week rose sharply, led by 17,000 tons for the Meeker Street Bridge, Brooklyn, going to American Bridge Co., and 10,960 tons for the Tacoma, Wash., Narrows Bridge, on the WEST COAST, going to Bethlehem Steel Co.

Except for PHILADELPHIA, where lettings are inconsequential and pending tonnages light except for 1500 tons for the Shrewsbury River Bridge, and 2000 tons for four Cape May bridges, the structural steel markets are stronger. Prospects for activity in OHIO, for example, are good, with housing projects at Columbus, Toledo and Youngstown, a veterans' hospital at Cleveland, and bridges at Youngstown and Lorain to require considerable steel.

Bethlehem Steel will supply 1400 tons for the Kenmore high school in the BUFFALO area while low bidder on the general contract for two schools at Lockport, N. Y., is De Riso Brothers, New York. New specifications for work in the NEW YORK area are close to 10,000 tons for the week, headed by 4250 tons for another section of the West Branch-Kensico aqueduct in Putnam County, N. Y.

Seventeen hundred tons for the Rockfort, Ky., state bridge over the Green River went to Bethlehem while 1200 tons for a field house at Virginia, Minn., was awarded to the Wisconsin Bridge & Iron Co., Milwaukee.

From PITTSBURGH and other points inquiries are reported increasing as the deadline approaches for PWA grants. The most important new project in the ST. LOUIS area is the 1600-ton Miami County, Mo., highway bridge. A 2500-ton Federal building in NEW ORLEANS is pending. On the WEST COAST, a Navy assembly building, San Diego, requiring 915 tons, was taken by the National Iron Works, San Diego. General Construction Co. and Columbia Construction Co. were low on most schedules of the Lake Washington pontoon bridge, Seattle, containing 5245 tons of shapes. Drydock towers at Portland, Ore, on which bids will be taken Dec. 15, call for 1250 tons of shapes.

Market Sidelights

Steel door frames for the Metropolitan housing project in the Bronx, New York, will be furnished by a Canton, Ohio, fabricator with a Cleveland mill supplying the several thousand tons of steel involved.

* * *

To heat the 33,000,000 cu. ft. in the seven hangars now building at North Beach Airport, near the New York World's Fair site on Long Island, 30 large Lee unit heaters have been ordered by the City of New York from Dravo Corp., Pittsburgh, at a cost of $161,490.

* * *

A. O. Smith Corp., Milwaukee, has booked orders for 11 large all-welded steel cracking vessels for export. The orders represent the largest sales of the Smith oil vessel division in several years, and are valued at upwards of $350,000. Eight of the 11 vessels are to be shipped to the Royal Dutch Shell interests for a refinery in the Dutch West Indies. Three are being made for a British interest establishing a new refinery in Australia. The vessels range from 8 to 10 ft. in diameter, and each will be 75 ft. in length.

* * *

The Harnischfeger Corp., Milwaukee, resumed operations Nov. 21 following the settlement of a strike which halted all activity, both plant and office, for 10 weeks. Asked to take a 10 per cent pay cut Sept. 6 because of declining business, employees refused and locked out all workers. The recent settlement provided for the 10 per cent reduction for a period of six months, at which time a partial or entire restoration is to be made, depending on current business.

IRON ORE

. . . *1938 movement on Lakes 19,263,011 tons*

NOVEMBER shipments totaling 1,481,305 gross tons brought the 1938 season movement to 19,263,011 tons, according to the final report of the Lake Superior Iron Ore Association, Cleveland. The November movement exceeded the comparable 1937 month by 56,626 tons. The season's movement was lowest since 1932.

CUMULATIVE FOR SEASON

Port	Dock	Season 1938	Season 1937
Escanaba	C&NW	1,077,809	3,147,977
Marquette	DSS&A	178,539	867,367
Marquette	LS&I	1,154,499	4,234,333
Ashland	C&NW	1,581,148	3,882,978
Ashland	Soo Line	693,453	1,768,901
Superior	Great Nor.	6,149,654	20,271,959
Superior	Soo Line	313,475	870,146
Superior	Nor. Pac.	360,359	1,080,011
Duluth	DM&IR	3,920,961	16,731,688
Two Harbors	DM&IR	3,833,114	9,743,476
Total		19,263,011	62,598,836

Total movements in other recent years are as follows:

Season		Season	
1938	19,263,011	1933	21,623,898
1937	62,598,836	1932	3,567,985
1936	44,822,023	1931	23,467,786
1935	28,362,368	1930	46,582,982
1934	22,249,600	1929	65,204,600

PLATES

. . . *Market fails to show gains at major consuming points*

DEMAND remains dull in most districts with an order for 500 tons of plates for box car ends featuring the CHICAGO market. The 30 barges for Central Barge Co. of Chicago will require 7500 tons of material. American Bridge Co. and Bethlehem Steel Co. will furnish 15 barges each, of the welded type, 195 ft. long,

35 ft. wide and 11 ft. deep, for delivery in early spring.

The plate market is listless in the PHILADELPHIA area, where some shipments on old export orders and small but fairly steady releases from shipyards are reported. Miscellaneous and warehouse business is lacking. Producers at PITTSBURGH and other areas are looking to the first quarter for railroad and shipyard business.

Bids on a Tacoma, Wash., pipe line requiring 1000 tons of 5/16-in. plates over 100 in. wide will be taken Dec. 15.

SHIPBUILDING

. . . Navy awards another battleship

THE Navy Department last week awarded a $52,794,000 contract to the New York Shipbuilding Corp., Camden, N. J., for the construction of one battleship, the *South Dakota*. It will require 14,000 tons of armor plate and 11,000 tons of plain steel.

Officials said the price, subject to adjustments for labor and material, represents a reduction of $2,000,000 from the figure originally bid by the company. Bids were opened for the construction of four battleships on Nov. 2 and awards were made for three of the ships on Nov. 19, one vessel being assigned to the Norfolk Navy Yard.

TIN PLATE

. . . Refunds extended to ternes

. . . Black plate prices revised

THE 25c. refund which has been made on tin plate on purchases from Jan. 1 to Nov. 10, 1938, has also been extended to special coated manufacturing ternes.

A revision in black plate, which was expected by the trade in order to correspond with the recent reduction in coated products, has been put into effect by some companies and will probably be followed by others. The product is now referred to as black plate, 29 gage and lighter. An f.o.b. Pittsburgh price of 3.05c. a lb. on base sizes has been established. A new list of extras effective Dec. 1 is to be issued, which will revise downward the width and gage extras to be applied to the new base. However, the same spread which heretofore existed between the gages will be maintained. This action removes the confusion which existed on black plate, 29 gage and lighter, when the hot rolled sheet base was utilized. Under the setup previous to Dec. 1, black plate was unobtainable at the published base price since in all specifications a width and gage extra was applicable.

Operations continue at 30 to 35 per cent.

RAILROAD BUYING

. . . C. & O. and Norfolk & Western in market for rails

WHILE the rail buying movement is not yet assuming its usual proportions for this time of year, some inquiries are making an appearance, notably those of the Chesapeake & Ohio for 25,000 tons and the Norfolk & Western for 13,000 tons. The Nickel Plate is expected to inquire for 5000 tons soon.

The Colorado Fuel & Iron Corp. was low bidder on 3160 tons of rails and 785 tons of tie plates to the Bureau of Reclamation for the Shasta Dam relocation of tracks.

The Illinois Central, which recently ordered 1000 freight cars from the American Car & Foundry Co., has issued a new inquiry for 1000 gondola cars. The freight cars will be fabricated at St. Louis.

Steel requirements for freight cars now pending total around 50,000 tons as follows: Norfolk & Western, 2100 cars, 30,000 tons; 1000 Illinois Central gondola cars, 12,000 to 15,000 tons; Wheeling & Lake Erie, 400 cars, 6000 tons.

Domestic railroad equipment manufacturers booked orders for three locomotives, 132 freight cars and 32 passenger-car trains in November, according to *Railway Age*. These compare with 29 locomotives, 2435 freight cars and no passenger-car trains in October. The cumulative totals of orders received during the first 11 months of the present year are 133 locomotives, 11,973 freight cars and 150 passenger-car trains. In the like period of 1937 orders aggregated 291 locomotives, 49,451 freight cars and 484 passenger-car trains.

WAREHOUSE SALES

. . . Sales at Chicago are best of the year

DECEMBER sales in the CHICAGO area contra-seasonally are likely to beat November and perhaps October. The last quarter of 1938 is the best of the year and may exceed the final quarter of 1937. Broad diversification of orders continues to feature this market.

At CLEVELAND the November movement was slightly below the previous month and current orders are light. Prices are spotty occasionally.

BOLTS, NUTS, RIVETS

. . . Prices withdrawn on headed and threaded items

CURRENT rivet quotations have been reaffirmed for first quarter of 1939. CLEVELAND producers report orders are light but the outlook is promising. The volume of bolt and nut orders has slowed down, but shipments to the automobile industry remain good. Jobbers are reluctant to add to their inventories at this time of year. The railroads continue on a hand-to-mouth basis and farm implement manufacturers are proceeding cautiously.

A number of consumers in and around CLEVELAND this week received notification of the temporary withdrawal of all prices on headed and threaded items, with the explanation that present prices are below manufacturing costs, and with the promise that new prices will be out soon.

COLD FINISHED BARS

. . . Prices unchanged for the first quarter

FIRST quarter prices will be unchanged from current quotations. Total bookings have eased off some as year end approaches. Auto buying is present but the volume is off slightly. With inventories at a low point, producers look to better miscellaneous demand during the first quarter.

MERCHANT BARS

. . . Booking highly miscellaneous . . . buyers marking time

REAFFIRMATION of present prices for first quarter has had little effect on PITTSBURGH hot rolled bar market as buyers have been marking time for several weeks. Bookings are highly miscellaneous with no large volume except where automotive business is concerned. Fill-in specifications are coming from bolt and nut makers and farm implement manufacturers and jobbers.

Bar mill operations at CLEVELAND and YOUNGSTOWN have tapered slightly recently, remaining in close relationship to demand, which is showing signs of the customary year end lull.

TUBULAR GOODS

. . . Slackness in oil - country goods purchases

LITTLE or no change in tubular goods sales volume has been noted in the PITTSBURGH district during the past week. Oil-country goods are not moving as briskly but both private and public building activity is sustaining standard pipe demand.

Principal tubular products are moving more slowly, according to CLEVELAND and YOUNGSTOWN producers, whose mill operations are becoming intermittent. Resale prices are spotty in certain areas.

SHEETS AND STRIP

. . . Production high but new orders are scarce

EMPHASIS continues on production. New orders continue in small volume at PITTSBURGH with a fair increase in business anticipated after the first of the year.

Demand for flat rolled products is quiet at CLEVELAND and YOUNGSTOWN. Production continues strong and it is difficult to satisfy all requests for immediate shipment of cold rolled sheets. A few consumers already have exhausted the modest stocks purchased in October and have reordered small quantities. Additional automotive purchases may be made this month.

The only important business expected during December by CHICAGO sellers is additional purchasing by the automobile industry. Deliveries are now extending into next year in some cases. Galvanized sheets are being ordered for combines and threshers. Tractor tonnage is fairly good, but little is in for tillage equipment.

Sheet specialties are selling fairly well in the NEW YORK area. A leading company in this line reported November bookings the best of the year next to October's, with only 40 per cent of the volume represented by low-priced material on contract.

Radio manufacturers in the EAST are specifying strip freely. A particularly active item at the moment is nickel coated strip for radio tube manufacture. Some of the leading tube makers have advanced January production schedules as much as 25 per cent over December.

At PHILADELPHIA miscellaneous sheet business, both full-finished and blue annealed, has fallen off sharply, the local auto body stamping plants being the only outlets through which the flow of steel is unabated.

WIRE PRODUCTS

. . . No first quarter prices announced on merchant items

PRESENT prices on wire rods and wire have been reaffirmed for first quarter delivery. Although no specific mention has been made of merchant wire products, no change in the current published quotations is expected for delivery in the near future. Total wire sales at PITTSBURGH are off some from a week ago due mainly to year-end influences.

CLEVELAND reports one of the leading producers has made no mention of first quarter prices on merchant products, indicating spot prices now prevail on nails and fence. At the same time, it is believed revision of nail extras will be delayed until orders and prices are firmer. Quarterly prices on merchant products have been a source of difficulty for some time. For first quarter of 1939 current base prices on rods and manufacturers' wire are reaffirmed. CLEVELAND reports demand for wire products has slipped, in line with reduced orders for the rest of the steel industry.

Sales of manufacturers' wire are at a good level in the EAST, and for some of the smaller producers the gains in these lines have more than offset the seasonal decline in hardware items and fencing wire. The market in NEW YORK is characterized by a steady flow of small orders from widely scattered sources. Bolt makers are specifying freely to cover automotive contracts.

With sales running ahead of the same month last year in. CHICAGO. wire sellers are facing the new year cheerfully. Manufacturers' wire orders continue good with the steady activity of motor car makers. Sales to implement and tractor plants are still light.

Award of steel for the largest suspension type bridge to be constructed on the Pacific Coast since the Golden Gate Bridge, the Tacoma, Wash., Narrows Bridge, went to Bethlehem Steel Co. Approximately 3817 tons of cable wire will be required.

REINFORCING BARS

. . . Awards at peak since early 1937 on West Coast

REQUIREMENTS this past week were spotty, the WEST COAST reporting the largest list of awards since the spring of 1937, both in tonnage and number, while the NEW YORK area reflected the lowest demand in several months, Bethlehem Steel Co. took 1618 tons for the Tacoma, Wash., Narrows Bridge, while Soule Steel Co. obtained three contracts totaling more than 2100 tons on the WEST COAST. SAN FRANCISCO reports the Bureau of Reclamation has issued an invitation for 2460 tons for the Shasta Dam power plant.

Thirty-nine hundred tons of bars for the Chicago subway will not be awarded until late this week or early next week. CHICAGO reports small projects numerous with the overall tonnage fairly good. Demand continues dull at BUFFALO. New inquiries at NEW YORK total approximately 1800 tons, half for road mesh requirements. OHIO projects include about 800 tons at Cleveland for a Lake Front highway extension and 415 tons of rail steel bars for a Sandusky filtration plant.

An award of 975 tons for the Thomas Circle underpass, Washington, went to Bethlehem Steel Co.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Dec. 6, 1938	Nov. 29, 1938	Nov. 9, 1938	Dec. 7, 1937	1938	1937
Fabricated structural steel awards	40,710	15,315	23,725	16,750	859,670	811,385
Fabricated plate awards	9,225	510	1,600	450	128,240	127,690
Steel sheet piling awards	2,070	300	5,435	250	46,960	59,030
Reinforcing bar awards	11,150	6,560	6,400	6,215	314,150	264,130
Total Letting of Construction Steel..	63,155	22,685	37,160	23,665	1,349,020	1,262,235

FABRICATED STEEL

NORTH ATLANTIC STATES

AWARDS

17,000 Tons, Brooklyn, superstructure, Meeker Street bridge over Newton Creek, to American Bridge Co., Pittsburgh.

1400 Tons, Kenmore, N. Y., high school, to Bethlehem Steel Co., Buffalo.

570 Tons, State of Pennsylvania, Curry Hollow Road, Willock, and Buttermilk Hollow Road bridges, to American Bridge Co., Pittsburgh.

500 Tons, Rocky Hil, Conn., Soldiers' Home, etc., to Bethlehem Steel Co., Bethlehem, Pa.; A. E. Stevens, Springfield, Mass., is contractor.

420 Tons, East Camden, N. J., elementary school, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

360 Tons, Clinton, N. Y., gymnasium building, Hamilton College, to Buffalo Structural Steel Co., Buffalo, N. Y.

160 Tons, Philadelphia, warehouse for Hancock Warehousing Co., to Robinson Iron & Steel Co., Philadelphia.

150 Tons, Bartlett, N. H., State bridge, to American Bridge Co., Pittsburgh; Hagan-Thibodeau, Wolfboro, N. H., contractor.

135 Tons, Sandisfield, Mass., bridge, to Phoenix Bridge Co., Phoenixville, Pa.

130 Tons, Bellefonte, Pa., County home, to Pittsburgh-Des Moines Steel Co., Pittsburgh; through Berwick Lumber & Supply Co.

125 Tons, Lynn, Mass., elementary school, to West End Iron Works, Cambridge, Mass.; E. C. Blanchard Co., Lynn, Mass., contractor.

100 Tons, Standish-Hollis, Me., State bridge, to American Bridge Co., Pittsburgh.

THE SOUTH

1700 Tons, Rockport, Ky., State bridge over Green River, to Bethlehem Steel Co., Bethlehem, Pa.

310 Tons, Grand Rivers, Ky., three buildings for TVA, to International Steel Co., Evansville, Ind.

307 Tons, Austin, Tex., project FAP 805 G, an unnamed fabricator.

200 Tons, Knoxville, Tenn., two dormitories for University of Tennessee, to Bristol Steel & Iron Co., Bristol, Tenn.

200 Tons, Autauga, Ala., bridge, to Virginia Bridge Co., Roanoke, Va.; through Newman Construction Co.

150 Tons, Hildreth, Fla., state highway bridge, to Bethlehem Steel Co., Bethlehem.

125 Tons, Louisville, Ky., male school, to Louisville Bridge & Iron Co., Louisville.

100 Tons, Ooltewah, Tenn., three bridges for TVA, to Carolina Steel & Iron Co., Greensboro, N. C.

CENTRAL STATES

1200 Tons, Virginia, Minn., field house, to Wisconsin Bridge & Iron Co., Milwaukee.

884 Tons, Chicago, Psychiatric Hospital, to Duffin Iron Works, Chicago.

600 Tons, Topeka, Kan., auditorium, to Kansas City Structural Steel Co., Kansas City, Kan.

500 Tons, Highland Park, Mich., Wayne County, railroad bridge, to Wisconsin Bridge & Iron Co., Milwaukee.

300 Tons, East St. Louis, Ill., factory building, Lummus Co., to Mississippi Valley Structural Steel Co., St. Louis.

280 Tons, Kokomo, Ind., warehouse for Continental Steel Co., to Indiana Bridge Co., Muncie, Ind.

220 Tons, Zumbro Falls, Minn., State bridge, to Minneapolis-Moline Power Implement Co., Minneapolis.

195 Tons, New London, Wis., Pearl Street bridge, to Worden-Allen Co., Milwaukee.

185 Tons, New Lisbon, Wis., grade separation, to Midland Structural Steel Co., Cicero, Ill.

160 Tons, Waterloo, Iowa, Rath Packing Co. building, to Des Moines Steel Co., Des Moines, Iowa; through Jens Olesen & Son.

155 Tons, Bradley, Mich., highway bridge, to Joseph T. Ryerson & Son, Inc., Chicago; through John W. Hertel.

135 Tons, Blakeslee, Ohio, State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

WESTERN STATES

10,960 Tons, Tacoma, Wash., Narrows bridge, to Bethlehem Steel Co., San Francisco; through Pacific Bridge Co., San Francisco, General Construction Co., Seattle, and Columbia Construction Co., Bonneville, Ore., joint contractors.

393 Tons, Dillard, Ore., Umpqua River bridge, to Poole & McGonigle, Portland; through C. J. Montag, Portland, contractor.

209 Tons, Los Angeles, telephone building, to Bethlehem Steel Co., Los Angeles.

182 Tons, Burbank, Cal., assembly building No. 5 for Lockheed Aircraft Corp., to Consolidated Steel Corp., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

7500 Tons, Jamestown, R. I., previously reported at 15,000 tons, bridge over Narragansett Bay; bids close Dec. 20. Parsons, Klapp, Brinckerhoff & Douglas, New York, are project engineers.

6000 Tons, Portsmouth, N. H., bridge.

5000 Tons, Milford-Stratford, Conn., bridge.

4250 Tons, Putnam County, N. Y., contract No. 319, West Branch-Kensico aqueduct; bids taken by Board of Water Supply, New York, until Dec. 20.

3500 Tons, Washington, gun assembly shop building No. 197.

1800 Tons, Red Bank, N. J., Oceanic bridge.

1700 Tons, Springfield, Mass., trade school.

1500 Tons, Middletown, Conn., hospital buildings.

1300 Tons, Lenox, Mass., grandstand, Lenox Racing Association.

625 Tons, New York, addition to hangar No. 3, North Beach Airport.

610 Tons, Elmira, N. Y., Madison Avenue bridge.

600 Tons, Elmira, N. Y., school building.

415 Tons, Brooklyn, addition to public school No. 142.

400 Tons, Harrisburg, Pa., Mayfair apartment building.

400 Tons, Harrison-Rye, N. Y., high school.

400 Tons, Providence, R. I., combination police and fire station.

350 Tons, New York, dispensary building.

315 Tons, New York, steel curbing.

300 Tons, Syracuse, N. Y., apartment buildings, Syracuse Housing Authority.

250 Tons, South Kortright, N. Y., Central School.

242 Tons, Warren County, N. Y., highway project S.H. 1963; bids close Dec. 20.

231 Tons, Delaware County, N. Y., highway project R.C. 4010; bids close Dec. 20.

210 Tons, Fayette, N. Y., central school.

180 Tons, Dayton, Pa., Mahoning Dam.

175 Tons, Annapolis, Md., chapel extension.

155 Tons, Washington, theater and store building, Brentwood Village Corp.

150 Tons, Braddock, Pa., junior high school.

150 Tons, Dutchess County, N. Y., includes 54 tons reinforcing bars, highway project R.C. 4011; bids close Dec. 20.

115 Tons, New York, apartment house, T. W. Temmler.

115 Tons, Homestead, Pa., high school building.

SOUTH AND SOUTHWEST

2500 Tons, New Orleans Federal building.

1800 Tons, Frankfort, Ky., State office building.

700 Tons, Brazoria, Tex., bridge.

150 Tons, Paintsville, Ky., Euclid Avenue, State bridge.

125 Tons, Elizabethtown, Ky., State grade separation.

115 Tons, Lordsburg, N. M., beam spans for Government.

CENTRAL STATES

1800 Tons, Youngstown, Ohio, Cedar Street bridge.

1600 Tons, Miami County, Mo., highway bridge; bids due Dec. 15.

800 Tons, Youngstown, Ohio, Marshall Street bridge.

500 Tons, Detroit, bottling plant addition, Pfeiffer Brewing Co.

400 Tons, Detroit, factory building, Hinde & Dauch Paper Co.

300 Tons, Zion, Ill., high school building; bids Dec. 8.

250 Tons, Alliance, Neb., power house.

240 Tons, Cleveland, Garfield Heights school; bids received Dec. 5.

240 Tons, Sandusky, Ohio, filtration plant; new bids Dec. 13. (Tonnage previously noted.)

175 Tons, Detroit, addition, manufacturing building, General Motors Corp.

150 Tons, Great Lakes, Ill., buildings, Naval Training Station.

Unstated tonnage, Cleveland, Veterans' Hospital; bids Dec. 27.

WESTERN STATES

5200 Tons, Seattle, Wash., Lake Washington; bids rejected on certain parts, and new bids asked Dec. 20 (previously reported).

1250 Tons, Portland, Ore., drydock towers; bids Dec. 16. (Tonnage previously noted.)

125 Tons, Reno, Nev., warehouse, Reno Grocery Co.

Unstated tonnage, Sacramento, Cal., bridge crane at Air Depot; bids Dec. 21.

FABRICATED PLATES

AWARDS

7500 Tons, Chicago, 30 steel barges for Central Barge Co., 15 to American Bridge Co., Pittsburgh, involving 4000 tons and 15 to Bethlehem Steel Co., Bethlehem, Pa., 3500 tons.

950 Tons, Sandusky, Ohio, 42 in. intake pipe line, to Taylor Forge & Pipe Works, Chicago.

570 Tons, Brooklyn, pontoon and shore pipe, to Tippett & Wood, Phillipsburg N. J.

105 Tons, Gravel Switch, Ky., caissons for TVA, to Chattanooga Boiler & Tank Co., Chattanooga, Tenn.

100 Tons, Norwood, Mass., water tank to Chicago Bridge & Iron Works, Boston.

NEW PROJECTS

5000 Tons, Southboro-Framingham-Wayland-Weston, Mass., Metropolitan District Supply water main.

1000 Tons, Tacoma, Wash., 9576 ft. of 58-in. inner diameter coal tar enameled pipe with 5/16-in. wall (lock-joint concrete alternate); bids Dec. 15.

SHEET PILING

AWARDS

1071 Tons, Tacoma, Wash., Narrows Bridge, to Bethlehem Steel Co.; through Pacific Bridge Co., San Francisco, General Construction Co., Seattle, and Columbia Construction Co., Bonneville, Ore., joint contractors.

1000 Tons, Los Angeles, bearing piles; to Carnegie-Illinois Steel Corp. for Ford Motor plant.

NEW PROJECTS

1100 Tons, Cleveland. New lake front highway extension; bids soon.

585 Tons, Newport, Ark., flood wall; List & Clark, Kansas City, Mo., general contractor.

Unstated tonnage, Mare Island, Cal., quay wall at Navy Yard, estimated cost, $800,000; bids Dec. 14.

. . . NON-FERROUS . . .

. . . *Dullness prevails in all markets . . . Lead prices dropped $3 a ton on Tuesday.*

THE unstable conditions that have characterized all the major non-ferrous metal markets since the drastic cut in spelter prices on Nov. 23 were the governing factors in the past week's market. The unsettled domestic situation was further aggravated by continued weakness in London prices. Yet despite the poor demand, shipments of all metals have been moving into consumption at a very satisfactory rate. In the copper market, extensive liquidation of Standard copper widened the spread between the producers' price and the outside market to 1.25c., as compared with 1c. a week ago. This spread limits producers' sales to intercompany transactions. At the time of going to press, producers were still quoting on the basis of 11.25c. per lb., Connecticut Valley, for electrolytic metal, but in view of the further decline in the foreign price to 10.225c. per lb., on Tuesday, a downward revision appears imminent.

Lead

The falling foreign price and the poor demand here forced another reduction in the price of lead on Tuesday. This cut brings prices down to a basis of 4.70c. per lb., St. Louis, the lowest since June 30. The week's sales, consisting mostly of prompt demands from battery, pigment and foil makers, totaled about 4500 tons. The January books, opened over a week ago, have very little tonnage on them, as buyers hesitate to commit themselves forward until more evidence is available that present prices are on a firm foundation.

Tin

The market was moderately active all week with prices moving within very narrow limits. The week's low price was 45.875c. and the high 46.25c., a spread of only 0.375c. The rising tendency on Monday and Tuesday was due in a large measure to the recovery in sterling exchange. Tin plate makers' demands for first quarter supplies again accounted for the bulk of the week's business.

Zinc

Very little demand was in evidence in the past week, outside of occasional carlots for 1939 delivery. The week's sales totaled only 1708 tons, while shipments, at 3750 tons, showed little change from the level of the past month. The chief threat to the present price level of 4.50c. per lb., East St. Louis, is that a continuation of the decline in London prices will put the cost of imported metal below the domestic grade, forcing another downward movement in prices here. Tuesday's London price of 2.81c. represents a loss of four points from the price of the preceding Tuesday or a total decline of 33 points in a month.

Non-Ferrous Average Prices

The average prices of the major non-ferrous metals in November as based on quotations appearing in THE IRON AGE, were as follows:

	Per lb.
Electrolytic copper, Conn. Valley	11.25c.
Lake copper, Eastern delivery	11.375c.
Straits tin, spot, New York	46.29c.
Zinc, East St. Louis	4.73c.
Zinc, New York	5.12c.
Lead, St. Louis	4.94c.
Lead, New York	5.09c.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Nov. 30	Dec. 1	Dec. 2	Dec. 3	Dec. 5	Dec. 6
Electro, copper[1]	11.25	11.25	11.25	11.25	11.25	11.25
Lake copper	11.375	11.375	11.375	11.375	11.375	11.375
Straits, tin, New York	46.25	46.125	45.875	....	46.00	46.25
Zinc, East St. Louis[2]	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis[3]	4.85	4.85	4.85	4.85	4.85	4.70

[1] Delivered Conn. Valley, deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Base per lb., Delivered

	New York	Cleveland
Tin, Straits pig	47.00c.	49.75c.
Copper, lake	12.25c.	12.375c.
Copper, electro	11.50c.	12.375c.
Copper, castings	11.25c.	11.875c.
*Copper sheets, hot-rolled	19.375c.	19.375c.
*High brass sheets	17.50c.	17.50c.
*Seamless brass tubes	20.25c.	20.25c.
*Seamless copper tubes	19.875c.	19.875c.
*Brass rods	13.375c.	13.375c.
Zinc slabs	6.25c.	7.25c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.75c.	5.60c.
Lead, bar	6.525c.	8.75c.
Lead sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	15.00c.	17.75c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	29.00c.	29.75c.
Babbitt metal, commercial grade	22.75c.	22.50c.

* These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.125c.	8.875c.
Copper, hvy. and wire	7.125c.	7.625c.
Copper, light and bottoms	6.375c.	6.625c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.375c.	7.875c.
No. 1 yel. brass turnings	4.125c.	4.625c.
No. 1 red brass or compos. turnings	6.125c.	6.75c.
Lead, heavy	3.75c.	4.625c.
Cast aluminum	7.50c.	8.75c.
Sheet aluminum	11.75c.	13.25c.
Zinc	2.25c.	3.50c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt, No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 12.25c. a lb. QUICKSILVER, $77 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11c. a lb. lcl.

IRON AND STEEL SCRAP

. . . Mill sales at Chicago again depress prices 50c., bringing composite price down 17c. to $14.75.

DEC. 6.—Recent mill sales at Chicago have brought $14, delivered, a decline of 50c. in heavy melting steel and related grades, the second in two weeks. With quoted prices on the prime grade unchanged at Pittsburgh and Philadelphia, the net effect of the softness at Chicago is a decline of 17c. in the composite, from $14.92 to $14.75, making a total loss of 25c. from the Nov. 22 high point of the year at $15. St. Louis dealers have dropped their buying prices 25c. to 50c. a ton, but in most centers previous price levels are being maintained. Railroad lists coming out the first of the month are bringing prices in line with the November lists, with a few items, such as iron and steel car axles, stronger. Except at Chicago, where recent sales have forced the market downward, little scrap is being sold into consumption. Mills at Buffalo are holding up shipments. Not much new buying is expected until after Jan. 1.

Export buying prices are unchanged.

Pittsburgh

Quotations on No. 1 heavy melting are unchanged from a week ago. Another small tonnage of No. 1 steel was sold into consumption last midweek at $15.50, while other points in the district continue to pay around $16 a ton. Scrap appears to be coming out more freely but no quotable weakness is indicated.

Chicago

Mill sales at $14 have depressed heavy melting steel 50c. further, with major open hearth grades following suit. With these sales, the long position of some Chicago interests is thought to be about equalized. A railroad list recently brought $14.85, delivered Chicago district, on heavy melting steel. Trade believes prices are at their proper level now, pointing out that the near $15 quotation of a few weeks ago was not justified by operations and conditions.

Philadelphia

Continued export buying is still serving to sustain this territory against the scattered weakness apparent in domestic markets in the West. About five boats are expected to dock here during December for whole or partial cargoes, which will serve to skim off all prepared heavy melting steel in this area. Domestic mills are not expected to return to the market until the turn of the year. The December Budd bundles, about 38,000 tons, are reported to have been split between a local mill and a broker, the bid prices being slightly higher than those submitted a month ago. Boston Iron & Metal Co. is scrapping the old Keystone furnace of Reading Iron Co., Reading, there being about 4500 tons of scrap involved.

Cleveland

With scrap coming out a little faster, dealers' buying prices here have softened slightly, but not enough to affect published quotations. Mill purchasing is inactive. Prices attained by the first monthly railroad sale were comparable to November prices, and hence no changes are made in railroad items.

Youngstown

Railroad steel coming to the Valley substantiates the present quoted price on No. 1 heavy melting, $15 to $15.50. Other quotations on the first of the monthly railroad lists were approximately the same as those received last month. Mill buying is nonexistent at present, but some foundry grades and specialties are understood to have been purchased by one of the smaller consumers in a nearby city recently.

Buffalo

A slow steel market is reflected in the scrap situation. Mills are holding up shipments because of coming inventories and not much buying is expected until next year. Some scrap has been moving in by water and has tended to slow rail shipments. Small sales of railroad malleable and steel rails under 3 ft. have advanced the price of both those commodities 50c. a ton.

St. Louis

Having bought sufficient tonnage to cover recent sales to mills, and there being no further mill commitments expected until after Jan. 1 because of inventories, dealers of scrap iron have cut their prices on melting grades: Nos. 1 and 2 heavy melting, No. 1 locomotive tires, and No. 2 wrought declined 25 c. and machine shop turnings and railroad malleable, 50c. Railroad springs and steel car axles, however, advanced 50c.

Cincinnati

Old materials ruled weaker the past week, with mills showing tendency to back away from the market. Production rates and reported low inventories, however, cause dealers to believe the present slack is only temporary, with some feeling of artificiality. Bids are unchanged and the trade is marking time awaiting developments.

Detroit

While scrap is being shipped freely to the major local consumer, the Detroit situation has shown slight softness, apparently a reflection from conditions in nearby scrap centers. However, it is generally agreed that the local situation has not eased enough to indicate a decline. Miscellaneous scrap is reported moving steadily by truck from automotive towns north of Detroit, the flow being steady enough to keep yards busy handling it.

New York

A quiet week has been passed, following the placing of large Japanese tonnages the week before. The European Scrap Cartel is to meet on Dec. 15, it is understood, but opinion is divided as to whether any new business will be placed in this country. Dealers' buying prices are unchanged, both for domestic and export shipment. The Sixth Avenue "L", to which the city acquired title Saturday night, was auctioned off for demolition on Monday. Portland Mill Wrecking Co., of San Francisco was high bidder at $80,000, but the deal will not finally be closed until the financial responsibility of the company is established as well as its ability to carry out the contract of demolishing the structure in 90 days. About 17,000 to 18,000 tons of structural material and 2000 tons of rails are involved.

Boston

Activity still centers in the export market. A steamer left here the past week with 3700 tons for Poland. Another boat is loading 4000 tons here, presumably for Italy. A boat is loading a sizable tonnage at Providence, and will complete the cargo at Boston. Local exporters expect to handle a sizable portion of the 170,000 tons recently purchased in this country by Japan, and anticipate the European cartel will shortly place 200,000 tons in America now that Japan has covered. Export prices are firm and unchanged. The domestic market for scrap is standing still with every indication of remaining so until after Jan. 1.

. . . CANADA . . .

. . . Railroad buying expected in near future.

TORONTO, Dec. 6.—Rail and rolling stock makers still are waiting contracts from the Canadian railroads and, while so far no awards have been announced, it is believed that prospective business of this nature will run to about the same level as in the preceding two years. Airplane contracts recently closed assure considerable business to the participating companies and also will be reflected in increased activities in other branches of the steel industry. The automotive industry is making steady progress toward higher operating schedules and leaders in this industry predict a record year in 1939.

Algoma Steel Corp., Sault Ste. Marie, Ont., has put in operation its new plant for production of steel balls and tubes for mining mills, now equipped to produce balls from 2½ to 5 in. and later will make all sizes from 2 to 5 in.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.50 to $16.00
Railroad hvy. mltng..	16.00 to 16.50
No. 2 hvy. mltng. steel.	14.25 to 14.75
Scrap rails	16.50 to 17.00
Rails 3 ft. and under..	17.00 to 17.50
Comp. sheet steel	15.50 to 16.00
Hand bundled sheets..	14.50 to 15.00
Hvy. steel axle turn..	14.00 to 14.50
Machine shop turn....	9.75 to 10.25
Short shov. turn.....	10.50 to 11.00
Mixed bor. & turn....	8.25 to 8.75
Cast iron borings.....	8.25 to 8.75
Cast iron carwheels...	15.00 to 15.50
Hvy. breakable cast...	12.50 to 13.00
No. 1 cupola cast.....	15.25 to 15.75
RR. knuckles & cplrs.	16.50 to 17.00
Rail coil & leaf springs	16.50 to 17.00
Rolled steel wheels...	16.50 to 17.00
Low phos. billet crops.	17.50 to 18.00
Low phos. punchings..	16.50 to 17.00
Low phos. plate	16.50 to 17.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.50 to $15.00
No. 2 hvy. mltng. steel.	13.00 to 13.50
Hydraulic bund., new.	14.50 to 15.00
Hydraulic bund., old..	11.50 to 12.00
Steel rails for rolling.	17.00 to 17.50
Cast iron carwheels...	16.50 to 17.00
Hvy. breakable cast...	.... to 16.00
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable	15.50 to 16.00
Machine shop turn....	8.50 to 9.00
No. 1 blast furnace....	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings..	10.00 to 10.50
No. 1 low phos. hvy...	16.50 to 17.00
Couplers & knuckles..	16.50 to 17.00
Rolled steel wheels ..	16.50 to 17.00
Steel axles	21.50 to 22.00
Shafting	20.00 to 20.50
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire	11.00 to 11.50
Cast borings. (chem.)..	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$13.50 to $14.00
Auto. hvy. mltng. steel alloy free	12.00 to 12.50
No. 2 auto. steel	10.75 to 11.25
Shoveling steel	13.50 to 14.00
Factory bundles	12.50 to 13.00
Dealers' bundles	11.50 to 12.00
Drop forge flashings..	11.50 to 12.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling, old..	6.25 to 6.75
Rolled carwheels	15.25 to 15.75
Railroad tires, cut....	16.25 to 16.75
Railroad leaf springs..	15.75 to 16.25
Steel coup. & knuckles	15.25 to 15.75
Axle turnings	12.75 to 13.25
Coil springs	16.75 to 17.25
Axle turn. (elec.)	13.75 to 14.25
Low phos. punchings..	16.25 to 16.75
Low phos. plates 12 in. and under	15.75 to 16.25
Cast iron borings	5.25 to 5.75
Short shov. turn.	7.00 to 7.50
Machine shop turn....	7.00 to 7.50
Rerolling rails	17.25 to 17.75
Steel rails under 3 ft..	15.75 to 16.25
Steel rails under 2 ft..	16.25 to 16.75
Angle bars, steel	15.25 to 15.75
Cast iron carwheels...	12.25 to 12.75
Railroad malleable	14.75 to 15.25
Agric. malleable	11.25 to 11.75
	Per Net Ton
Iron car axles	19.50 to 20.00
Steel car axes	19.00 to 19.50
Locomotive tires	15.25 to 15.75
Pipes and flues	9.25 to 9.75
No. 1 machinery cast.	12.25 to 12.75
Clean auto. cast.	12.25 to 12.75
No. 1 railroad cast....	11.25 to 11.75
No. 1 agric. cast.....	10.75 to 11.25
Stove plate	8.25 to 8.75
Grate bars	8.25 to 8.75
Brake shoes	9.25 to 9.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 hvy. mltng. steel.	13.75 to 14.25
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.50 to 14.00
Hydraulic bundles	14.25 to 14.75
Machine shop turn....	9.75 to 10.25

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to $14.50
No. 2 hvy. mltng. steel.	13.50 to 14.00
Comp. sheet steel	13.50 to 14.00
Light bund. stampings	11.00 to 11.50
Drop forge flashings..	13.00 to 13.50
Machine shop turn....	7.00 to 7.50
Short shov. turn.....	7.50 to 8.00
No. 1 busheling	13.00 to 13.50
Steel axle turnings....	11.00 to 11.50
Low phos. billet and bloom crops	18.00 to 18.50
Cast iron borings	7.75 to 8.25
Mixed bor. & turn....	7.75 to 8.25
No. 2 busheling	7.75 to 8.25
No. 1 cast	16.50 to 17.00
Railroad grate bars ..	9.50 to 10.00
Stove plate	10.00 to 10.50
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	17.00 to 17.50
Railroad malleable ...	15.50 to 16.00
Cast iron carwheels ..	14.00 to 14.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to $14.50
No. 2 hvy. mltng. steel.	12.00 to 12.50
Scrap rails	15.00 to 15.50
New hvy. b'ndled sheets	12.00 to 12.50
Old hydraul. bundles..	11.00 to 11.50
Drop forge flashings...	12.00 to 12.50
No. 1 busheling	12.00 to 12.50
Hvy. axle turnings....	10.50 to 11.00
Machine shop turn....	6.75 to 7.25
Knuckles & couplers..	16.50 to 17.00
Coil & leaf springs....	16.50 to 17.00
Rolled steel wheels....	16.00 to 16.50
Low phos. billet crops.	15.50 to 16.00
Shov. turnings	8.75 to 9.25
Mixed bor. & turn.....	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Steel car axles	16.50 to 17.00
No. 1 machinery cast..	15.50 to 16.00
No. 1 cupola cast.	14.50 to 15.00
Stove plate	13.00 to 13.50
Steel rails under 3 ft..	18.00 to 18.50
Cast iron carwheels...	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Chemical borings	9.00 to 9.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$13.00 to $13.50
No. 1 hvy. melting....	13.00 to 13.50
No. 2 hvy. melting....	12.00 to 12.50
No. 1 locomotive tires.	13.00 to 13.50
Misc. stand. sec. rails.	13.75 to 14.25
Railroad springs	15.50 to 16.00
Bundled sheets	8.00 to 8.50
No. 1 busheling	7.50 to 8.00
Cast. bor. & turn.....	4.00 to 4.50
Machine shop turn....	4.50 to 5.00
Heavy turnings	9.00 to 9.50
Rails for rolling	17.00 to 17.50
Steel car axles	19.00 to 19.50
No. 1 RR. wrought....	10.75 to 11.25
No. 2 RR. wrought....	13.00 to 13.50
Steel rails under 3 ft..	15.50 to 16.00
Steel angle bars	14.50 to 15.00
Cast iron carwheels...	14.00 to 14.50
No. 1 machinery cast..	14.50 to 15.00
Railroad malleable ...	12.00 to 12.50
No. 1 railroad cast....	12.50 to 12.75
Stove plate	9.00 to 9.50
Grate bars	8.50 to 9.00
Brake shoes	10.00 to 10.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$12.00 to $12.50
No. 2 hvy. mltng. steel.	9.75 to 10.25
Scrap rails for mltng.	15.75 to 16.25
Loose sheet clippings.	7.25 to 7.75
Hydrau. b'ndled sheets	11.50 to 12.00
Cast iron borings	4.50 to 5.00
Machine shop turn....	5.75 to 6.25
No. 1 busheling	8.50 to 9.00
No. 2 busheling	3.25 to 3.75
Rails for rolling	18.00 to 18.50
No. 1 locomotive tires.	14.75 to 15.25
Short rails	18.50 to 19.00
Cast iron carwheels...	13.25 to 13.75
No. 1 machinery cast.	14.00 to 14.50
No. 1 railroad cast.....	13.25 to 13.75
Burnt cast.	7.25 to 7.75
Stove plate	7.25 to 7.75
Agricul. malleable	12.25 to 12.75
Railroad malleable	14.75 to 15.25
Mixed hvy. cast.	11.00 to 11.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel....	$12.50 to $14.00
Scrap steel rails	14.50 to 15.00
Short shov. turnings..	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought	.... to 10.00
Rails for rolling	16.00 to 16.50
No. 1 cast.	.... 14.50
Tramcar wheels	.... 14.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$10.75 to $11.25
No. 2 hvy. mltng. steel.	9.00 to 9.50
Borings and turnings.	5.75 to 6.25
Long turnings	5.50 to 6.00
Short shov. turnings..	6.50 to 7.00
No. 1 machinery cast..	12.25 to 12.75
Automotive cast	13.50 to 14.00
Hvy. breakable cast...	9.75 to 10.25
Hydraul. comp. sheets.	11.75 to 12.25
Stove plate	8.00 to 8.50
New factory bushel...	10.75 to 11.25
Sheet clippings	8.50 to 9.50
Flashings	9.00 to 9.50
Low phos. plate scrap	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$10.50 to $11.00
No. 2 hvy. mltng. steel.	9.00 to 9.50
Hvy. breakable cast...	12.00 to 12.50
No. 1 machinery cast.	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Steel car axles	20.00 to 20.50
Shafting	15.50 to 16.00
No. 1 RR. wrought....	11.00 to 11.50
No. 1 wrought long....	9.50 to 10.00
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Clean steel turnings*..	4.00 to 4.50
Cast borings*	3.50 to 4.00
No. 1 blast furnace...	3.50 to 4.00
Cast borings (chem.)..	9.50 to 10.00
Unprepared yard scrap	6.00 to 6.50
Light iron	3.00 to 3.50
Per gross ton, delivered local foundries:	
No. 1 machn. cast†....	$13.50 to $14.00
No. 2 cast†	10.50 to 11.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	Nominal
Scrap rails	Nominal
No. 2 steel	Nominal
Breakable cast	$10.15
Machine shop turn....	.... 3.38
Mixed bor. & turn.....	$2.00 to 2.25
Bun. skeleton long....	.... 8.15
Shafting	10.25 to 10.50
Cast bor. chemical....	5.50 to 5.75
Per gross ton delivered consumers' yards:	
Textile cast	$13.50 to $15.00
No. 1 machine cast....	13.50 to 15.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$12.50 to $14.00
No. 2 hvy. mltng. steel.	11.50 to 13.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$9.50	$9.00
No. 2 hvy. mltng. steel.	8.00	7.50
Mixed dealers steel....	7.00	6.50
Scrap pipe	5.50	5.00
Steel turnings	4.50	4.00
Cast borings	3.50	3.00
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	11.00	10.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	$11.50 to $12.00
No. 2 hvy. mltng. steel.	10.00 to 10.50
No. 2 cast	.... 11.00
Stove plate	$10.00 to 10.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	$13.25 to $13.50
No. 2 hvy. mltng. steel.	12.25 to 12.50
Rails (scrap)	.... 13.50
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.	$14.00 to $14.50
No. 2 hvy. mltng. steel.	13.00 to 13.50

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

(Prices are f.o.b. unless otherwise indicated)

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.25c.
Detroit, delivered	2.35c.
Duluth	2.35c.
Philadelphia delivered	2.57c.
New York	2.59c.
On cars dock Gulf ports	2.60c.
On cars dock Pacific ports	2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.10c.
On cars dock Tex. Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c. to 2.05c
Detroit, delivered	2.00c. to 2.15c.
On cars dock Tex. Gulf ports	2.25c. to 2.40c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.75c. to 1.90c.
Detroit, delivered	1.85c. to 2.00c.
On cars dock Tex. Gulf ports	2.10c. to 2.25c.
On cars dock Pacific ports	2.35c.

Prices on reinforcing bars have been subject to concessions of $3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

	Base per Lb.
Pittsburgh, Buffalo, Cleveland, Chicago and Gary	2.70c.
Detroit	2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P't'g	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.15c.
Detroit, delivered	2.25c.
Philadelphia, delivered	2.32c.
Granite City	2.25c.
On cars dock Pacific ports	2.65c.
Wrought iron, Pittsburgh	4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.20c.
Detroit, delivered	3.30c.
Granite City	3.30c.
Philadelphia, delivered	3.52c.
On cars dock Pacific ports	3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron Pittsburgh	6.10c.

Electrical Sheets

(*F.o.b. Pittsburgh*)

	Base per Lb
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	4.95c.
Special Dynamo	5.65c.
Transformer	6.15c.
Transformer Special	7.15c.
Transformer Extra Special	7.65c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.95c.
F.o.b. cars dock Pacific ports	4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

***Tin Plate**

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	4.40
Pittsburgh or Gary	$4.30

Roofing Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(*Widths up to 12 in.*)

	Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.

Cooperage Stock

Pittsburgh & Chicago	2.25c

COLD ROLLED STRIP*

	Base per Lb
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	3.10c.
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	.51 .75	4.30c.	4.50c.
Carbon	.76-1.00	6.15c.	6.35c.
Carbon	1.01 to 1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.45
Coated nails	2.45
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.20
Woven wire fence, base column.	67
Single loop bale ties, base col...	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool..	$2.54

Note: Birmingham base same on above items, except spring wire.

Add $4 a ton for Mobile, Ala.; $5 for New Orleans; $6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are $1 a ton additional in ecah case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	56	36	¼ & ⅜	.+ 9	+30
¼ to ⅜	.59	43½	½	24	6½
½	....63½	54	¾	30	13
¾	....66½	58	1 & 1¼	..34	19
1 to 3	...68½	60½	1½	38	21½
			2	....37½	21

Lap Weld

2	61	52½	2	....30½	15
2½ & 3	..64	55½	2½ to 3½	31½	17½
3½ to 6	..66	57½	4	....33½	21
7 & 8	..65	55½	4½ to 8.32½		20
9 & 10	..64½	55	9 to 12	..28½	15
11 & 12	..63½	54			

Butt weld, extra strong, plain ends

⅛	....54½	41½	¼ & ⅜	.+10	+43
½ to ⅜	.56½	45½	½	25	9
½	....61½	53½	¾	31	15
¾	....65½	57½	1 to 2	...38	22½
1 to 3	...67	60			

Lap weld, extra strong, plain ends

2	59	51½	2	....33½	18½
2½ & 3		55½	2½ to 4.39		25½
3½ to 6	..66½	59	4½ to 6.37½		24
7 & 8	..65½	56	7 & 8	..38½	24½
9 & 10	..64½	55	9 to 12	..32	20½
11 & 12	..63½	54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d....13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d...13 B.W.G.	10.67	9.26	....
1½ in. o.d...13 B.W.G.	11.79	10.23	$9.72
1¾ in. o.d...13 B.W.G.	13.42	11.64	11.06
2 in. o.d....13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d...13 B.W.G.	16.76	14.54	13.79
2½ in. o.d...12 B.W.G.	18.45	16.01	15.16
2½ in. o.d...12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d...12 B.W.G.	21.42	18.59	17.54
3 in. o.d....12 B.W.G.	22.48	19.50	18.35
3½ in. o.d...11 B.W.G.	28.37	24.62	23.15
4 in. o.d....10 B.W.G.	35.20	30.54	28.66
4½ in. o.d...10 B.W.G.	43.04	37.35	35.22
5 in. o.d.... 9 B.W.G.	54.01	46.87	44.25
6 in. o.d.... 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Pet Net Ton

*6-in. and larger, del'd Chicago.	$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham.	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles....	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $42, Birmingham, and $50 delivered Chicago and 4-in. pipe, $45, Birmingham, and $54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts: ½ in. & 6 in. and smaller.	65, 5 and 5*
Larger and longer up to 1 in.	60, 10 and 5*
1⅛ in. and larger	60, 5 and 5*
Lag bolts	60, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7	65, 5 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped: ½ in. and smaller	65 and 5
9/16 in. to 1 in. inclusive.	60, 5 and 5
1⅛ in. and larger	60 and 5

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

	U.S.S.	S.A.E.
Semi-fin. hexagon nuts		
¼ to 7/16 in. incl.	65-10	70-5
½ to 9/16 in.	65-5	70
⅝ to 1-in. incl.	60-10	65
1¼ in. and larger	60-5	60-5

Beyond the above, an additional 10 per cent allowed for full container quantities.

Stove bolts in packages, nuts attached	75
Stove bolts in packages, with nuts separate	75 and 12½
Stove bolts in bulk	85

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham $3.40

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham .... 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled square head set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller.	70 and 10
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	67½ and 10
Upset set screws, cup and oval points	75 and 10
Milled studs	60½ and 10

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.80c.
Delivered, Detroit	2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes.	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	.18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 3d. to 21s. 6d.
Steel bars, open hearth.	£11
Beams, open-hearth	£10 12s. 6d.
Channels, open-hearth	£10 17s. 6d.
Angles, open-hearth	£10 12s. 6d.
Black sheets, No. 24 gage.	£13
Galvanized sheets, No. 24 gage	£15 5s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheets ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	$22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown*	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa. Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	$22.00
F.o.b. Everett, Mass.	23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa. Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$25.00
Delivered Chicago	28.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$92.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$28.00
Domestic, 26 to 28%	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio
Per Gross Ton

10.00 to 10.50%	$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, 1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$92.75
2.50% carbon	97.75
2% carbon	102.75
1% carbon	112.75

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$2.00
Ferrotungsten, lots of 500 lbs. nominally	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots.	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports
Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore
Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	12c.
Iron, low phos., Swedish, aver age, 68½% iron	12½c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	32c.
Man., African, Indian, 44-48%	30c.
Man., African, Indian, 49-51%	32c.
Man., Brazilian, 46 to 48½%	29c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$20.00
Tungsten, domestic, scheelite delivered	$20.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$15.00
Rhodesian, 45%	19.00
Rhodesian, 48%	23.00
Turkish, 48-49%	23.00
Turkish, 45-46%	19.00
Turkish, 40-44%	16.00
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$24.00
48-49%	22.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$17.00 to $18.00
Domestic, f.o.b. Ohio River landing barges	18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	18.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal

No. 2 or diesel, f.o.b. Bayonne	4.125c.
No. 6, f.o.b. Bayonne	2.26c.
Del'd Chicago, No. 5 Bur. Stds.	3.25c.
Del'd Chicago, No. 6 Bur. Stds.	2.75c.
Del'd Cleve'd, No. 3 distillate	5.50c.
Del'd Cleve'd, No. 4 industrial	5.25c.
Del'd Cleve'd, No. 5 industrial	3.00c.
Del'd Cleve'd, No. 6 industrial	2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75
Foundry, f.o.b. Connellsville, Prompt	$4.75 to 5.50
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

Industry Speaks

HENRY FORD—"I am confident that the time is near when there will be so many jobs available in this country that the entrance of a few thousand Jews or other emigrants will be negligible."

THOMAS J. WATSON, president, International Business Machines Corp.—"Under present world conditions, I am in favor of my country increasing her armaments as a peace measure."

FRANK D. NEWBURY, economist, Westinghouse Electric & Mfg. Co.—"Not since the recovery from the 1921 depression has there been a time when underlying conditions have been so favorable.

Industry Listens

"You undergraduates who see me for the first time have read your newspapers and heard on the air that I am, at the very least, an ogre—a consorter with Communists, a destroyer of the rich, a breaker of our ancient traditions. You think of me perhaps as the inventor of the economic royalist, of the wicked utilities, of the money changers of the temple. You have heard for six years that I was about to plunge the nation into war; that you and your little brothers would be sent to the bloody fields of battle in Europe; that I was driving the nation into bankruptcy, and that I breakfasted every morning on a dish of 'grilled millionaire.' Actually I am an exceedingly mild-mannered person—a practitioner of peace, both domestic and foreign, a believer in the capitalistic system, and for my breakfast a devotee of scrambled eggs."—PRESIDENT ROOSEVELT.

Ingot Output Gained Nearly 14.6% in November

STEEL ingot output in November totaling 3,572,220 gross tons was the largest for any month since September, 1937, and showed a gain of nearly 14.6 per cent over that of October, this year, according to the monthly report of the American Iron and Steel Institute.

While bessemer steel production declined, open-hearth output gained almost 19 per cent. The industry operated at an average of 62.05 per cent of its capacity last month compared with 52.45 per cent in October.

Output for 11 months of this year was 24,696,092 gross tons. Thus the indication for the year is for a production of around 28,000,000 tons exclusive of electric and crucible steel.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Reported by Companies Which in 1936 Made 98.29 Per Cent of the Open-Hearth and 100 Per Cent of the Bessemer Ingot Production)

	Reported Production (Gross Tons)		Calculated Production All Companies			
1938	Open-Hearth	Bessemer	Monthly	Weekly	Number of Weeks	Per Cent of Capacity
January	1,604,363	99,991	1,732,764	391,143	4.43	29.15
February	1,550,772	125,493	1,703,726	425,932	4.00	31.74
March	1,822,398	157,737	2,012,406	454,268	4.43	33.85
1st Quarter	4,977,533	383,221	5,448,896	423,709	12.86	31.58
April	1,762,315	131,644	1,925,166	448,757	4.29	33.44
May	1,647,049	130,590	1,806,805	407,857	4.43	30.39
June	1,493,148	118,688	1,638,277	381,883	4.29	28.46
2d Quarter	4,902,512	380,922	5,370,248	412,778	13.01	30.76
1st 6 Months	9,880,045	764,143	10,819,144	418,212	25.87	31.17
July	1,821,815	127,982	1,982,058	448,429	4.42	33.42
August	2,309,306	196,789	2,546,988	574,941	4.43	42.85
September	2,407,233	207,887	2,657,748	620,969	4.28	46.28
3d Quarter	6,538,354	532,658	7,186,794	547,357	13.13	40.79
9 Months	16,418,399	1,296,801	18,005,938	461,691	39.00	34.41
October	2,844,358	223,208	3,117,934	703,823	4.43	52.45
November	3,370,974	201,246	3,572,220	832,685	4.29	62.05

Edsel Ford Advocates Free Licensing Policy

WASHINGTON.—Edsel B. Ford, president of the Ford Motor Co., the first witness when the anti-monopoly committee turned its attention to the automobile patent situation on Monday, told the committee that the company's free patent licensing policy had encouraged competition in the industry.

Mr. Ford, who was accompanied to the stand by Joseph I. Farley, patent counsel for the company, testified that the Ford Motor Co. did not pay or charge royalties for the use of patents. Since 1909, he said, the company has not filed a single suit for patent infringement although it has been sued 60 times since 1926. Only one case was decided against the company, he asserted.

Hugh Cox, 33-year-old assistant to the Attorney General, who directed the questioning, was frequently interrupted by various members of the committee. Asked by Chairman O'Mahoney if he recommended the free patent licensing system for other industries, Ford said every industry has its own problems.

"The system," he told O'Mahoney, "has benefited the automobile industry and is well worth looking into."

The automobile manufacturer recommended: (1) Placing of some restrictions on the length of time a patent application is allowed to remain in the patent office; and (2) reinstatement of the policy under which notices of patent infringement must be given companies accused of infringement. Beyond that he said he was not prepared to go.

1937 Locomotive Output Exceeds Total for 1935

WASHINGTON.—Valued at $72,123,158, the production of railroad, mining and industrial locomotives in 1937 exceeded the 1935 output, valued at only $17,383,347, by 314.9 per cent, according to the Bureau of the Census. The output of railroad locomotives included 401 steam units, valued at $43,082,885, and 193 diesel-electric units, valued at $13,920,943.

REINFORCING STEEL

. . . Awards of 11,150 tons— 16,800 tons in new projects.

AWARDS

975 Tons, Washington, Thomas Circle underpass, to Bethlehem Steel Co., Bethlehem, Pa.; through James Stewart Co., New York, contractor.

400 Tons, Portsmouth, N. H., storehouse, Bureau of Yards and Docks, to Bethlehem Steel Co.; through Aberthaw Construction Co., contractor.

300 Tons, Reading, Pa., high service reservoir, to Truscon Steel Co., Youngstown; through C. W. Good, contractor.

275 Tons, Camp Dix, barracks, to Bethlehem Steel Co., Bethlehem Pa.

226 Tons, Beltsville, Md., research center, Department of Agriculture, to Rosslyn Steel & Cement Co., Washington.

CENTRAL AND WESTERN STATES

1618 Tons, Tacoma, Wash., Narrows Bridge, to Bethlehem Steel Co.; through Pacific Bridge Co., San Francisco, General Construction Co., Seattle, and Columbia Construction Co., Bonneville, Ore., joint contractors.

861 Tons, Sacramento, Cal., state office building, to Soule Steel Co., San Francisco; through Campbell Construction Co., contractor.

770 Tons, San Diego, Cal., Navy pier (Specifications 8840), to Soule Steel Co., Los Angeles; through Shannahan Brothers, contractor.

485 Tons, San Francisco, Laguna Honda Home, to Soule Steel Co., San Francisco; through Monson Brothers, San Francisco, contractor.

442 Tons, Hamilton Field, Cal., runways (110 tons bars, 332 tons fabric), to Columbia Steel Co., San Francisco; through N. M. Ball & Son, Berkeley, contractors.

434 Tons, Los Angeles, United States Treasury Procurement Office (various schedules), to Bethlehem Steel Co., Los Angeles.

409 Tons, San Francisco, George Washington High School gymnasium, to Bethlehem Steel Co., San Francisco; through Myer Construction Co., San Francisco, contractor.

369 Tons, Los Angeles, North Hollywood High School, to Western Steel Erecting Co., Los Angeles.

350 Tons, Los Angeles, County purchasing agent, to Ceco Steel Products Co., Los Angeles.

262 Tons, Odair, Wash., Columbia Basin project (Invitation 38184-A), to Youngstown Sheet & Tube Co., Youngstown, Ohio.

260 Tons, Rutledge, Tex., Colorado River project (Invitation 46647-A), to Tennessee Coal, Iron & Railroad Co., Birmingham.

221 Tons, Los Angeles, Kern Avenue Junior High School, to Consolidated Steel Corp., Los Angeles.

212 Tons, Engle, N. M., Rio Grande project (Invitation A-8755-A), to Republic Steel Corp., Cleveland, Ohio.

180 Tons, Los Angeles, San Pedro High School, to Ceco Steel Products Co.; through Contracting Engineers, Los Angeles, contractor.

170 Tons, Delano, Cal., auditorium, to Soule Steel Co., San Francisco.

167 Tons, Blaisdell, Ariz., Gila project (Invitation 24666-A), to Columbia Steel Co., San Francisco.

140 Tons, Modesto, Cal., Hall of Records, to Gunn-Carle & Co., San Francisco; through Trewitt-Shields & Fisher, contractor.

133 Tons, Santa Monica, City Hall, to Consolidated Steel Co.

128 Tons, San Diego, Cal., Hoover High School gymnasium, to Consolidated Steel Corp., Los Angeles; through Charles L. Hoskins, San Diego, contractor.

114 Tons, Indio, Cal., highway bridges, to Ceco Steel Products Co., Los Angeles; through W. E. Robertson, Los Angeles, contractor.

114 Tons, South Pasadena, Cal., Arroyo Seco Parkway bridges, to Blue Diamond Corp., Los Angeles; through Claude Fisher, Los Angeles, contractor.

112 Tons, Saugus, Cal., overhead crossing, to Ceco Steel Products Co., Los Angeles; through W. E. Robertson, Los Angeles, contractor.

112 Tons, Shafter, Cal., school, to Consolidated Steel Corp., Los Angeles.

103 Tons, Los Angeles, Gompers School auditorium, to Truscon Steel Co., Youngstown.

100 Tons, Carlsbad, N. M., sewage disposal plant, to Darbyshire-Harvey Co., El Paso, Tex.; through Robert E. McKee, El Paso, contractor.

CANAL ZONE

700 Tons, Coco Solo, C. Z., Navy quarters (Specification 8843), to Bethlehem Steel Co.; through Tucker McClure, Balboa, C. Z., contractor.

PENDING REINFORCING BAR PROJECTS

NORTH ATLANTIC STATES

5000 Tons, Southboro - Framingham - Wayland-Weston, Mass., Metropolitan District Supply water main.

1200 Tons, Jamestown, R. I., bridge over Narragansett Bay; bids close Dec. 20; Parsons, Klapp, Brinckerhoff & Douglas, New York, engineers.

426 Tons, Delaware County, N. Y., highway project R. C. 4010, mostly mesh, also 42,500 ft. cable guard railing; bids received until Dec. 20 by Department of Public Works, Albany, N. Y.

400 Tons, Allegheny County, Pa., McKnight Road.

400 Tons, New York, addition to Hunter College.

350 Tons, New York, Welfare Island dispensary building; bids in.

250 Tons, Milford-Stratford, Conn., bridge.

195 Tons, Orange County, N. Y., highway project R. C. 4008; Parlor City Construction Co., Endicott, N. Y., low on general contract.

150 Tons, Cambridge, Mass., city incinerator.

150 Tons, Middletown, Conn., administration and employees' buildings.

125 Tons, Brooklyn, public school 142.

120 Tons, Uniontown, Pa., sewage disposal plant.

105 Tons, Norwich, Conn., infirmary.

100 Tons, Westchester County, N. Y., highway project R. C. 2551; Thos. A. Brogan, Yonkers, N. Y., low on general contract.

100 Tons, Warren County, N. Y., highway project S. H. 1963; bids close Dec. 20; also required are 14,500 ft. of cable guard railing.

CENTRAL AND WESTERN STATES

9500 Tons, Seattle, Wash., Lake Washington bridge; bids rejected and new bids asked Dec. 20 on certain portions.

2460 Tons, Coram, Cal., Shasta Dam power plant (Invitation E-37461-A); bids Dec. 12.

1400 Tons, city of Pasadena.

1125 Tons, Mare Island, Cal., Navy shop foundations (revised tonnage); bids in.

800 Tons, Cleveland, new lakefront highway extension; bids soon.

415 Tons, Sandusky, Ohio, rail steel bars for filtration plant; new bids Dec. 13. (tonnage previously noted).

400 Tons, Fort Wayne, Ind., water works

300 Tons, Madison, Wis., sewage treatment plant.

250 Tons, Newport, Ark., flood wall; List & Clark, Kansas City, Mo., general contractor.

182 Tons, San Diego, fleet moorings.

160 Tons, Littleton and Sedalia, Colo., highway work.

135 Tons, drainage structure between North Little Rock and Gilette, Ark. (tonnage previously noted); MacGeorge Construction Co., Pine Bluff, Ark., general contractor.

133 Tons, Sonora, Cal., auditorium and science building.

130 Tons, Long Beach, Cal., Spencer Kellogg plant addition.

124 Tons, Ventura, Cal., water plant.

113 Tons, Corbett, Wyo., Shoshone project (Invitation C-10141); bids in.

101 Tons, Los Angeles, Adams School auditorium.

Unstated Tonnage, San Francisco, junior college science building; bids Dec. 14.

Unstated Tonnage, Cleveland, Veterans' Hospital; bids Dec. 27.

McKenna Metals Co., 144 Lloyd Avenue, Latrobe, Pa., manufacturer of Kennametal tools and blanks for steel and metal cutting, has licensed George H. Alexander Machinery, Ltd., 82 Coleshill Street, Birmingham, England, to sell Kennametal and fabricate tools from that metal in Great Britain and British possessions excluding Canada.

Exports (In Gross Tons)

	October		Ten Months Ended October	
	1938	1937	1938	1937
Pig iron	61,339	66,297	373,846	719,666
Ferromanganese and spiegeleisen	6	3	233	1,629
Other ferroalloys	70	235	1,000	2,338
Scrap, iron and steel	221,466	184,547	2,386,323	3,466,055
Scrap, tin plate	1,643	338	13,932	25,810
Waste-waste tin plate	845	733	6,137	25,643
Pig iron, ferroalloys and scrap	*285,369*	*252,153*	*2,781,471*	*4,241,141*
Ingots, blooms, billets, sheet bars	5,980	35,730	146,632	231,243
Ingots, etc., alloy steel incl. stainless	1	218	7,215	7,012
Skelp	13,817	3,892	27,541	73,889
Wire rods	1,232	7,182	20,376	50,750
Semi-finished steel	*21,050*	*47,022*	*201,764*	*362,894*
Bars, plain and reinforcing	11,493	13,969	119,545	116,156
Bars, alloy steel	224	465	3,917	5,331
Bars, stainless steel	4	10	547	190
Iron bars	152	45	1,275	2,001
Plates, plain and fabricated	19,559	59,067	178,994	347,981
Plates, alloy steel	175	14	2,192	2,404
Plates, stainless	9	4	252	138
Sheets, galvanized steel	7,148	7,841	59,080	62,897
Sheets, galvanized iron	74	347	3,067	4,307
Sheets, black, plain steel	13,830	27,273	154,801	233,498
Sheets, alloy steel	498	81	3,180	4,619
Sheets, stainless	99	42	1,561	736
Sheets, black iron	632	1,331	6,289	9,812
Hoops, bands, strips, plain steel	6,052	7,715	49,035	94,106
Hoops, bands, strip steel, alloy	35	67	355	1,035
Hoops, bands, strip steel, stainless	34	103	487	523
Tin plate and taggers' tin	12,330	36,098	135,583	270,180
Terne plate (including long terne)	214	332	3,749	4,424
Structural shapes, plain material	5,944	8,650	70,568	117,957
Structural material, fabricated	4,423	4,672	32,714	32,044
Sheet piling	276	1,635	2,864	6,442
Tanks, steel	3,217	4,521	33,681	28,933
Steel rails	6,164	14,420	73,275	93,111
Rail fastenings, switches, spikes, etc.	816	2,345	10,993	15,104
Boiler tubes	602	3,107	11,429	12,958
Casing and oil line pipe	3,980	9,849	57,749	78,506
Pipe, black and galv., welded steel	2,535	2,095	19,867	34,100
Pipe, black and galv., welded iron	296	616	4,516	5,937
Plain and galvanized wire	5,124	4,568	39,375	49,685
Barbed wire and woven wire products	4,541	3,105	29,988	34,612
Wire rope and other products	708	1,239	8,364	14,524
Nails and tacks	2,520	1,103	20,399	18,742
Bolts, nuts, rivets and washers except track	674	937	6,643	9,642
Other finished steel	201	121	2,689	2,330
Rolled and finished steel	*114,583*	*217,787*	*1,149,023*	*1,714,965*
Cast iron pipe and fittings	1,594	1,614	26,012	26,793
Malleable iron screwed fittings	280	632	2,606	4,394
Carwheels and axles	1,235	1,437	18,468	14,044
Castings, iron and steel	448	861	5,283	10,655
Castings, alloy steel, incl. stainless	60	199	675	1,435
Forgings, plain	382	801	6,956	7,746
Forgings, alloy steel, incl. stainless	450	105	758	781
Castings and forgings	*4,449*	*5,649*	*60,758*	*65,848*
Total	425,431	522,611	4,193,016	6,384,848

Imports (In Gross Tons)

	October		Ten Months Ended October	
	1938	1937	1938	1937
Pig iron	1,174	11,870	30,358	95,908
Sponge iron	18	24	380	1,534
Ferromanganese[1]	2,281	656	14,221	23,216
Spiegeleisen	2,720	222	9,771	17,116
Ferrochrome[2]	.....	20	100	260
Ferrosilicon[3]	61	345	610	2,729
Other ferroalloys[4]	.....	.....	1	52
Scrap	5,524	7,684	13,183	77,941
Pig iron, ferroalloys and scrap	*11,778*	*20,821*	*68,624*	*218,756*
Steel ingots, blooms, etc.	32	6	197	130
Billets, whether solid or hollow	21	335	491	1,821
Wire rods	415	1,282	3,997	13,779
Semi-finished steel	*468*	*1,623*	*4,685*	*15,730*
Concrete reinforcement bars	86	14	1,101	3,766
Hollow steel bars	79	295	683	2,159
Merchant steel bars	1,261	1,928	15,314	39,918
Iron slabs	.....	.....	.....	1
Iron bars	5	116	152	1,743
Boiler and other plate (incl. skelp)	8	9	303	213
Sheets, skelp, and saw plate	61	142	5,829	8,485
Die blocks or blanks, etc.	3	5	71	98
Tin plate	8	15	91	206
Structural shapes	3,279	4,097	31,970	68,649
Sheet piling	235	.....	235	2,161
Rails and track material	157	140	3,041	7,813
Welded pipe	822	615	4,927	8,079
Other pipe	2,421	1,166	19,785	28,729
Cotton ties	1,867	.....	8,692	454
Other hoops and bands	1,079	1,310	13,638	23,237
Barbed wire	973	2,367	11,230	14,629
Round iron and steel wire	199	308	1,168	4,131
Telegraph and telephone wire	2	1	9	17
Flat wire and steel strips	243	288	2,095	3,102
Wire rope and strand	162	309	1,750	3,127
Other wire	114	99	1,178	3,085
Nails, tacks, and staples	414	1,010	6,081	14,047
Bolts, nuts, and rivets	30	69	186	546
Horse and mule shoes	40	38	379	379
Rolled and finished steel	*13,548*	*14,341*	*130,208*	*238,774*
Malleable iron pipe fittings	9	.....	76	404
Cast iron pipe and fittings	104	113	1,225	2,729
Castings and forgings	538	288	3,339	3,979
Total	26,445	37,186	208,157	480,372

[1] Manganese, [2] chrome, [3] silicon and [4] alloy content, respectively.

October Iron-Steel Exports Rise for Second Consecutive Month

OCTOBER exports of iron and steel products (excluding scrap) from the United States registered an increase for the second consecutive month, according to preliminary reports from the Metals and Minerals Division of the Bureau of Foreign and Domestic Commerce. Shipments totaled 201,477 gross tons, valued at $11,463,891, in comparison with 196,395 tons, valued at $11,176,437, in September.

Imports amounted to 20,921 tons, valued at $1,300,714, in comparison with 23,740 tons, valued at $1,332,035, in September. Total imports during the first 10 months of 1938 amounted to 194,974 tons, valued at $12,193,206, against 402,431 tons, valued at $21,280,294 in the same period last year.

The outstanding product shipped in October from a tonnage standpoint was pig iron, with 61,339 tons, going mostly to Japan, 48,637 tons; Italy, 6174 tons, and Germany, 5000 tons.

Exports of scrap totaled 223,954 tons, valued at $3,238,232, in comparison with 149,673 tons, valued at $2,093,925 in the preceding month.

October Imports of Iron and Manganese Ores

(In Gross Tons)

	Iron Ore		Manganese Concentrates, 35 Per Cent or Over	
	1938	1937	1938	1937
Canada	....	84	....	....
Cuba	21,000	33,000	3,122	....
Chile	155,200	152,750	....	....
Spain	....	....	....	....
Norway	25,116	6,086	....	....
Sweden	14,546	36,860	....	....
French Africa	7,480	....	....	....
Russia	....	....	4,914	15,327
India	....	....	3,367	1,953
Brazil	....	....	....	6,719
Gold Coast	....	....	3,924	13,378
Other Countries	3,060	26,937	....	....
Total	226,402	255,717	15,327	37,377

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	October		Ten Months Ended October	
	1938	1937	1938	1937
United Kingdom	....	....	42	100
British India	606	7,015	11,965	57,875
Germany	....	....	....	510
Netherlands	203	4,119	12,928	25,269
Canada	335	736	1,830	6,098
France	....	....	....	....
Belgium	....	....	....	....
Norway	....	....	3,538	875
Sweden	30	....	55	600
Russia	....	....	....	4,581
Other Countries	....	....	....	....
Total	1,174	11,870	30,358	95,908

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Joseph E. Seagram & Sons, Inc., 405 Lexington Avenue, New York, plans new operating units and installation of equipment in plant on Seventh Street Road, Louisville. Cost about $750,000 with machinery.

United Speedometer Repair Co., 436 Fifty-seventh Street, New York, has leased building at 342 West Seventieth Street for production of precision parts for automobile accessories, repairs, etc. Present works will be removed to new location.

Superintenent of Lighthouses, St. George, Staten Island, New York, asks bids until Dec. 15 for 20 300-mm. weatherproof electric lanterns (Circular 58323).

Midtown Chevrolet, Inc., 304 East Forty-fifth Street, New York, has leased six-story and basement building at 1920-26 Broadway, totaling 150,000 sq. ft. floor space, for headquarters. Upper floors and part of main floor will be used for service, repair and reconditioning shops. A garage unit will be provided with capacity of about 300 cars.

Board of Education, Hyde Park, N. Y., plans manual training department in new three-story senior high school. Cost over $500,000. Financing has been arranged through Federal aid. R. R. Graham, 25 Prospect Street, Middletown, N. Y., is architect.

Brewster Aeronautical Corp., 27-01 Bridge Plaza North, Long Island City, airplane parts and equipment, has completed alterations in building at Long Island City, formerly held by Pierce Arrow Motor Car Co., and will proceed with installation of equipment. Property consists of main four-story building with two one-story extensions, totaling about 170,000 sq. ft. of floor space. Facilities will be provided for about 900 operatives. Present plant will be transferred to new location. P. M. Stephenson is production manager.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Dec. 23 for one hydraulic surface grinder (Circular 91).

State Department of Public Buildings, State Office Building, Albany, N. Y., plans new vocational school at West Coxsackie, N. Y., Cost about $745,000. Appropriation in that amount has been arranged. State Department of Architecture, William E. Haugaard, commissioner, address noted, is in charge.

Universal Slide Fastener Co., New York, recently organized, has leased about 10,000 sq. ft. of floor space in building at 40 West Twenty-fifth Street, for manufacturer of metal fasteners and kindred specialties.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 13 for 12 motor-driven plate scarfing and plate edge planers (Schedule 5001) for Brooklyn, Boston, Norfolk and Puget Sound Navy yards; until Dec. 16, four semi-trailers (Schedule 5031) for Brooklyn yard.

Federal Electric Products Co., 14 Avenue L, Newark, N. J., manufacturer of switches, panelboards and other electrical equipment, has purchased former plant of Fenwick-Reddaway Co., 46 Paris Street, consisting of one and two-story building of 23,000 sq. ft. floor space. Structure will be remodeled and one-story addition, totaling 20,000 sq. ft., will be erected. Present works will be removed to new location and increased capacity carried out. Company also operates branch plant at Long Island City, which will be continued.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Dec. 13 for two motor-driven presses (Circular 421); until Dec. 14 for 144 reamers (Circular 426).

Bureau of Yards and Docks, Navy Department, Washington, plans one-story steel pickling plant at Philadelphia Navy Yard. Cost about $100,000 exclusive of equipment. Other shops will be built at this yard, in addition to units now under way. Fund of $5,784,548 has been authorized for project, and it is expected to increase this amount next year.

United States Engineer Office, Philadelphia, asks bids until Dec. 12 for one 20-in. dredging pump, with suction mouth piece, bolts, nuts and accessories (Circular 171); until Dec. 15, one six-cylinder, 16 x 16 in., uniflow vertical steam engine, with dredge pump impeller shaft, thrust shaft, coupling bolts and nuts, radial bearing and housing, and auxiliary equipment (Circular 168).

BUFFALO DISTRICT

New York State Electric & Gas Corp., Ithaca, N. Y., is arranging appropriation of about $880,000, through sale of bond issue, for expansion and improvements in power plants and system, including installation of new equipment, transmission and distributing lines, and other facilities.

Taylor Wine Co., Rheims, N. Y., plans two one-story additions for storage and distribution. Cost over $65,000 with equipment. Wiard & Martin, 315 Alexander Street, Rochester, N. Y., are architects.

Board of Trustees, Cornell University, Ithaca, N. Y., plans one and multi-story materials testing and metallurgical laboratory on campus. Cost over $1,000,000 with equipment. Total appropriation of $3,500,000 has been authorized for this and a new chemical engineering building.

NEW ENGLAND

Procter & Gamble Co., Gwynne Building, Cincinnati, soaps, washing powders, etc., has acquired 10-acre tract at Quincy, Mass., for new Eastern branch plant, with power house, pumping station, machine shop and other mechanical departments. Cost about $1,000,000 with equipment.

City Property Committee, Administration Building, Springfield, Mass., Fred E. Barker, chairman, has asked bids on general contract for new multi-story trade school. Cost about $1,452,795, of which $647,843 has been secured through a Federal grant. Gardner & King, 33 Lyman Street, are architects.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Dec. 19 for two motor-driven small automatic milling machines (Circular 181); until Dec. 21, four geared-head production lathes (Circular 180).

WASHINGTON DIST.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Dec. 28 for quantity of jigs, including angletube, chin seam, deflector, facepiece-holding, embossing and inlet valve seat; angletube drying and holding racks, outlet valve guard wrenches, wood table with jigs, and jigs for cutting table (Circular 168).

E. M. Fleischmann Distilling Corp., recently organized, has acquired plant of Monumental Distilleries, Inc., Lansdowne, Md., and will make extensions and improvements, including installation of new equipment. Company is headed by E. M. Fleischmann, formerly president of Calvert Distilling Co., Inc., Relay, Md.

Supply Officer, Engineer Reproduction Plant, Fort Humphreys, D. C., asks bids until Dec. 23 for a motor-driven punching machine (Circular 5).

Board of District Commissioners, District Building, Washington, asks bids until Dec. 14 for one swinging boom truck crane.

City Council, Danville, Va., plans expansion and improvements in municipal airport, including three new steel hangars with shop and reconditioning facilities, administration building and other structures. Cost about $600,000. Financing is being arranged. C. L. Scott is engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec. 12 for 12 barrel warehouse hand trucks, 25,000 ft. of steel wire cloth, 20,000 ft. of galvanized steel wire poultry netting, steel machine bolts with nuts, steel rivets, steel cap screws, brass wood screws, brass eye screws, galvanized steel eye and ring bolts, sheet brass grommets, copper tacks, one water pump and other equipment (Schedule 3400).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 13 for one motor-driven pipe and nipple threading and cutting machine (Schedule 5002) for Chelsea yard; 28 steam-jacketed kettles, each 80-gal., and 16 bibbs (Schedule 5018) for Brooklyn and Philadelphia yards; until Dec. 16, 118 power-driven fuel oil pumps (Schedule 5005) for Philadelphia and Sewall's Point yards; until Dec. 13, nippers and pliers (Schedule 4862); until Dec. 20, carbon and high-speed twist drills (Schedule 4995); motor-driven engine lathe and attachment (Schedule 4996) for Eastern and Western yards.

WESTERN PA. DIST.

Ideal Foundry & Machine Co., Beaver Falls, Pa., plans rebuilding part of plant recently destroyed by fire, with loss close to $50,000 including equipment.

Department of Public Works, Bureau of Water, City-County Building, Pittsburgh, F. M. Roessing, director, asks bids until Dec. 12 for steel water storage tank and accessories for installation at Blackstone and Tesla Streets.

R. E. Uptegraff Mfg. Co., 300 North Lexington Avenue, Homewood, Pittsburgh, manufacturer of electrical transformers and parts, plans rebuilding part of plant recently damaged by fire. Loss about $40,000 with equipment.

SOUTHWEST

Shell Petroleum Corp., Shell Building, St. Louis, has let general contract to Gamble Construction Co., 620 Chestnut Street, for two-story addition to main oil refinery at Roxana, Ill., 170 x 325 ft., primarily for a compounding production unit. Cost over $150,000 with equipment.

Hull & Dillon Packing Co., Pittsburg, Kan., meat packer, has let general contract to T. C. Meyers, Pittsburg, for two-story and basement addition, 86 x 140 ft. Cost over $50,000 with equipment. Daniel R. Sandford, Wilhoit Building, Springfield, Mo., is architect.

George Muehlebach Brewing Co., 316 Oak Street, Kansas City, Mo., has let general contract to Rau Construction Co., 2409 Harrison Street, for extensions and improvements in plant, including additional equipment. Cost about $125,000.

Southland Paper Mills, Inc., Lufkin, Tex., E. L. Kurth, president, and head of Angelina Lumber Co., same place, organized several months ago, is arranging additional financing in amount of $1,615,000 through sale of stock, to make a total fund of $5,040,000 with financing through RFC aggregating $3,425,000, entire appropriation to be used for new newsprint mill on local site, using natural gas as fuel. General contract recently was let to Merritt-Chapman & Scott Corp., 17 Battery Place, New York, and work is scheduled to begin soon. George F. Hardy, 305 Broadway, New

York, is consulting engineer. Perkins-Goodwin Co., 30 Rockefeller Plaza, New York, paper stocks, is interested in new company.

City Council, Robstown, Tex., asks bids until Dec. 10 for new municipal electric power plant, including diesel engine-generator units and auxiliary equipment. Cost about $274,000. Financing has been arranged. Garrett Engineering Co., Houston, Tex., is consulting engineer.

Lincoln Engineering Co., 5701 Natural Bridge Avenue, St. Louis, has under construction one-story addition containing 63,000 sq. ft. of floor space for production of lubricating equipment.

Kisco Boiler & Engineering Co., 4333 Duncan Avenue, St. Louis, has moved to 39th Street and Chouteau Avenue, occupying 35,000 sq. ft. of floor space, for manufacture of high-pressure boilers, regulators, air ventilating and air circulating equipment.

SOUTH CENTRAL

Buckeye Cotton Oil Co., Memphis, Tenn., cottonseed oil products, has let general contract to Frank Ragsdale, Dermon Building, for one-story building for storage and distribution. Cost about $45,000 with equipment. Company is a subsidiary of Procter & Gamble Co., Cincinnati.

Board of Trustees, Alabama Polytechnic Institute, Auburn, Ala., will take bids soon on general contract for one and multi-story engineering building. Cost about $100,000 exclusive of equipment. Warren, Knight & Davis, Protective Life Building, Birmingham, are architects.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Thomas, Ky., asks bids until Dec. 12 for one 10,000-gal. steel tank for gasoline storage, and one gasoline dispensing pump (Circular 906-11).

Board of Directors, Alabama State Docks, Mobile, Ala., has low bid from Rust Engineering Co., Clark Building, Pittsburgh, for one-story addition to bulk handling plant at docks, at $118,600, exclusive of equipment. J. B. Converse & Co., Inc., Wilson Building, is consulting engineer.

SOUTH ATLANTIC

Walker Electric Co., 526 Means Street, N.W., Atlanta, Ga., electrical equipment, will take bids soon on general contract for one-story storage and distributing plant, 80 x 120 ft. Cost close to $40,000 with equipment.

Southern Mining & Power Co., Dahlonega, Ga., plans new mill at local mining properties, with power house, machine shop and other mechanical structures. Financing in amount of $350,000 is being arranged through sale of preferred stock, for this and development of mines.

MIDDLE WEST

H. M. Harper Co., 3620 West Fletcher Street, Chicago, manufacturer of bolts, nuts, studs, etc., has asked bids on general contract for one-story addition. Cost close to $45,000 with equipment. Ralph D. Huszagh, 6 North Michigan Avenue, is architect.

General Household Utilities Co., 2638 North Pulaski Street, Chicago, is arranging early discontinuance of its plant at Marion, Ind., used for production of radio equipment and parts, and will dispose of property to company now being organized by Marion interests, which will continue operations for similar line of manufacture. General Household company will concentrate on production of refrigerators and parts at Chicago plant in future.

Hump Hairpin Mfg. Co., 1918 South Prairie Avenue, Chicago, wire goods, has asked bids on general contract for three-story and basement addition to present one-story plant, 70 x 170 ft. Cost about $100,000 with equipment, instead of a smaller amount previously noted. Alfred S. Alschuler, 28 East Jackson Boulevard, is architect.

Supervising Construction Engineer, Indian Service, Billings, Mont., asks bids until Dec. 28 for three 150-hp. watertube boilers for power house at Pipestone, Minn.; also for one deaerating feed water heater, and three boiler-feed pumping units and accessories for same station.

City Council, Anita, Iowa, has plans for new municipal electric power plant and electrical distributing system, diesel engine generator units and accessories to be used. Cost about $160,000, of which $111,000 will be a bond issue, recently approved, and remainder a Federal grant. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Frederick H. Levey Co., Inc., 221 East Cullerton Street, Chicago, manufacturer of printing inks, etc., has let general contract to Poirot Construction Co., 2001 West Pershing Road, for new one-story plant, 108 x 111 ft., at District Boulevard and Kildare Avenue. Cost over $50,000 with equipment. A. Epstein, 2001 West Pershing Road, is architect and engineer.

City Council, Port Washington, Wis., is about to ask bids for new municipal incinerator plant estimated to cost about $50,000 with equipment. Miss Addie Lynch is city clerk.

Grant County Board, Lancaster, Wis., has placed general contract with Raymond Klaas & Co., Louisburg, Wis., for county highway garage and maintenance building costing about $60,000 without equipment. Alonzo Aupperle is county clerk.

MICHIGAN DISTRICT

Mid-West Refineries, Inc., Alma, Mich., has approved plans for expansion and improvements, including cracking machinery for gasoline production and other equipment. Cost over $50,000 with equipment.

United Beef Co., 2380 Twentieth Street, Detroit, meat packer, will ask bids soon on general contract for one-story addition to main packing house. Cost over $40,000 with equipment.

Grand Haven Harbor Industries, Inc., Grand Haven, Mich., W. L. Stribley, 1 Washington Avenue, head, recently organized by Mr. Stribley and associates, with capital of $100,000, plans new bulk oil plant on local waterfront, including steel tank division, pumping station and other structures. Cost over $50,000.

OHIO AND INDIANA

Hilton-Davis Chemical Co., Langdon Road and Pennsylvania Railroad, Cincinnati, industrial chemicals, plans several new one and multi-story buildings and installation of equipment. Cost about $900,000.

City Council, Lakewood, Ohio, has let general contract to H. F. Juergens Co., 15430 Edgewater Drive, for new one story municipal service, repair and garage building, 75 x 200 ft., at 12920 Berea Road, at $66,290, exclusive of equipment. B. R. Kimberley, building department, City Hall, is architect.

Triplex Screw Co., 5317 Grant Avenue, Cleveland, manufacturer of cap screws, nuts, studs, etc., has asked bids on general contract for one-story addition, 90 x 220 ft. Cost over $65,000 with equipment.

Will-Burt Co., Orrville, Ohio, manufacturer of valves, separators and other engineering specialties, will take bids soon on general contract for one-story addition, 40 x 60 ft. Cost close to $40,000 with equipment.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Dec. 12 for bomb type rack assemblies, bomb release interval assemblies and gun control switch assemblies (Circular 404), wobble pump control torque shaft bearings, supercharger control lock assemblies (Circular 414); until Dec. 14, 400 vacuum pump assemblies (Circular 378); until Dec. 21, 100 drift meter assemblies (Circular 408).

Jewett & Sherman Co., West Florida Street, Milwaukee, canned food products, has leased building at 5201 Denison Avenue, Cleveland, and adjoining tract of over one acre and will improve for new branch processing and canning plant.

Board of County Commissioners, Court House, Richmond, Ind., asks bids until Dec. 17 for new steam power house, 26 x 76 ft., at county institution near city, including boiler units and accessories, pumping equipment, etc. C. E. Working, 2002 East Main Street, is architect.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until Dec. 12 for 480 48-in. steel hand cart wheels and 40 steel axles with malleable iron nuts (Circular 431-84).

PACIFIC COAST

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for superstructure for one-story foundry, 180 x 408 ft., at Mare Island (Specifications 9062). General contract has been let to Hunt & Curry Co., 1701 B Street, San Diego, Cal., for one-story addition to final assembly shop at naval air station, San Diego, at $235,500, exclusive of equipment (Specifications 8934).

Fernando Milling & Supply Co., 6104 Van Nuys Boulevard, Van Nuys, Cal., will ask bids soon on general contract for rebuilding grain milling plant recently destroyed by fire, with loss of about $250,000 including equipment. New units will be of one and multi-story type, totaling 90,000 sq. ft. of floor space, with 3000-ton storage tank. W. Charles Swett will be in charge of work.

United States Engineer Office, 751 South Figueroa Street, Los Angeles, asks bids until Dec. 21 for six service gates and gate hoists for Prado dam (Circular 184).

Exchange Lemon Products Co., Corona, Cal., has let contract to Consolidated Steel Corp., Ltd., 5700 South Eastern Avenue, Los Angeles, for two-story packing plant, 50 x 109 ft. Cost over $65,000 with mechanical-handling and other equipment. Laurence J. Waller, 601½ New Hampshire Avenue, Los Angeles, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 13 for chain hoists (Schedule 4971) for Puget Sound Navy Yard and Eastern yards, until Dec. 20 for 45 corrosion-resisting steel folding anchors, and 45 anchor cable clamps (Schedule 5036), for San Diego Naval Air Station, Seattle and Eastern yards; one motor-driven air compressor, four low-pressure compressors, two high-pressure compressors and spare parts (Schedule 5054) for Mare Island yard.

Contracting Officer, Quartermaster Corps, Sacramento, Cal., asks bids until Dec. 21 for gasoline fueling system for engine test building at local depot (Circular 6870-10).

FOREIGN

Public Works Department, Wellington, New Zealand, asks bids until Jan. 17 for power cable and control equipment (No. 699); until Jan. 24, switchgear and steel switchyard structures for Mangahao power scheme (No. 460); until Jan. 31, turbines and generating units, with auxiliary equipment, for Waikaremoana power scheme (No. 157).

Scophony, Ltd., London, England, Solomon Sagall, founder and managing director, manufacturer of television equipment, is organizing an American subsidiary, under name of Scophony Corp. of America, Inc., with capital of $10,000,000 to build a plant in United States for manufacture of similar equipment, under license of parent company, including parts production and assembling. Work on new plant will begin early next year.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

	November 1938	October 1938	September 1938	October 1937	Ten Months 1937	Ten Months 1938
Steel Ingots: (gross tons)						
Monthly output[a]		3,117,934	2,657,748	3,392,924	45,875,521	21,123,872
Average weekly output[a]		703,823	620,969	765,897	105,631	486,389
Per cent of capacity[a]		52.45	46.28	58.31	80.42	36.25
Pig Iron: (gross tons)						
Monthly output[b]		2,052,284	1,680,435	2,892,629	33,114,269	14,301,525
Raw Materials:						
Coke output[c] (net tons)		3,156,106	2,730,789	4,260,600	46,025,400	25,872,124
Lake Ore consumed[d] (gross tons)		2,780,585	2,313,865	4,203,873	49,344,984	17,485,458
Castings: (net tons)						
Malleable, orders[e]		32,989	29,061	34,810	502,049	217,327
Steel, orders[e]		.....	25,565	36,837	815,711	.....
Finished Steel: (net tons)						
Trackwork shipments[a]		2,410	2,346	6,137	84,028	29,814
Fabricated shape orders[f]		137,642	92,469	62,267	1,396,726	922,996
Fabricated plate orders[e]		21,793	18,551	31,942	373,914	236,630
U. S. Steel Corp. shipments[g]		663,287	577,666	792,310	11,749,156	5,251,511
Fabricated Products:						
Automobile production[h]		215,296	89,623	337,979	4,292,459	1,858,331
Steel furniture shipments[e]		$1,718‡	$1,667‡	$2,020‡	$22,824‡	$16,643‡
Steel boiler orders[e] (sq. ft.)		717,307	578,940	635,505	8,767,265	6,201,857
Locomotives ordered[j]		29	5	0	278	130
Freight cars ordered[j]		2,435	1,079	21	47,826	11,841
Machine tool index[k]		118.1	117.4	152.0	180.8†	118.8†
Foundry equipment index[l]		87.9	78.7	185.2	224.6†	83.3†
Non-Ferrous Metals: (net tons)						
Lead shipments[m]		45,726	39,026	39,292	508,060	345,712
Lead stocks[m]		117,476	131,353	100,646	.....	.....
Zinc shipments[n]		43,355	43,582	40,345	507,890	312,507
Zinc stocks[n]		124,128	130,743	25,817	.....	.....
Tin deliveries[o] (gross tons)	3,535	4,960	4,465	8,210	73,450	43,725
Refined copper shipments[p]		82,605	67,919	44,592	751,393	494,844
Refined copper stocks[p]		267,299	293,080	181,842	259,351	267,299
Exports: (gross tons)						
Total iron and steel[q]		425,431	346,068	522,611	6,384,848	4,193,016
All rolled and finished steel[q]		114,583	112,915	217,787	1,714,965	1,149,023
Scrap[q]		221,466	147,203	184,547	3,466,055	2,386,323
Imports: (gross tons)						
Total iron and steel[q]		26,445	27,958	37,186	480,372	208,157
Pig iron[q]		1,174	6,922	11,870	95,908	30,358
All rolled and finished steel[q]		13,548	10,349	14,341	238,774	130,208
British Production: (gross tons)						
Pig iron[r]		469,400	429,800	769,600	6,949,100	5,855,400
Steel ingots[r]		854,800	754,700	1,133,600	10,681,900	8,878,100

† Three months' average. ‡ 000 omitted.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp; [h] Preliminary figures from the Automobile Manufacturers Association—Final figures from Bureau of the Census, U. S. and Canada; [i] F. W. Dodge Corp.—37 Eastern states; [j] *Railway Age*; [k] National Machine Tool Builders Association; [l] Foundry Equipment Manufacturers Association; [m] American Bureau of Metal Statistics; [n] American Zinc Institute; [o] New York Commodity Exchange; [p] Copper Institute; [q] Department of Commerce; [r] British Iron and Steel Federation.